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SECURITY INFORMATION

ANNEX I

To Proceedings of Mine Warfare Panel

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PART ONE - DOCTRINE

1. **PROBLEM.** To evaluate existing mine warfare doctrine and recommend changes in appropriate field manuals where such changes are found to be desirable.

2. **ASSUMPTIONS.**

a. Current land mine warfare developmental objectives will be achieved.

b. Labor, time, and resources will be adequate to produce mine warfare materiel in sufficient quantities to implement a proposed mine warfare program.

c. Continued research and development will provide increasingly effective mine warfare materiel.

d. Adequate training will be provided to support the approved mine warfare doctrine.

3. **FACTS.** The term mine includes all types of mines and mine prototypes of direct interest to land forces regardless of the method of delivery to the point of use or emplacement.

4. **DISCUSSION.** In evaluating existing mine warfare doctrine, the tactical and strategic feasibility of land mine warfare and the adequacy of existing materiel and planned developments were reviewed. This review was conducted during phase I, when authorities on all phases of land mine warfare made presentations to the Mine Warfare Panel. With this review as a base, an examination of the component parts of mine warfare doctrine was undertaken to determine how overall requirements could best be met. The following paragraphs discuss the primary areas that were examined. Certain areas of doctrine were found to be completely adequate and will receive no mention in this study.

a. The role of the mine in military operations. (Appendix D).

(1) Mines should normally be employed to enhance the effect of our weapons and to permit the most effective employment of our troops. The mine is essentially a defensive mechanism even though it may be employed in conjunction with offensive operations. A mine field is an obstacle and as such must be considered a part of the barrier plan.

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(2) Mines currently under development will not produce an unbreachable mine field. However, properly sited mine fields will canalize and enforce delay on the enemy by forcing him to attempt to bypass them or to make the necessary effort to breach them. Either will assist the user in gaining parity through the time gained for the more effective employment of his force at the threatened point and the resultant greater attrition of the enemy forces. This is true in either the tactical or the strategic sense.

(3) Current doctrine on the role of mines is substantially sound, but does not specifically point out their use in deep, extensive mine fields as part of the strategic barrier plan or in strategic or tactical interdiction. These uses do not change doctrine, they merely extend its application. Either use will be tactically beneficial to a defending force. However, the decision to adopt and apply mine warfare on such a large scale that it becomes of strategic importance must be made by the commander at theater level or higher. In arriving at his decision, he must consider the political, psychological, and economic, as well as the purely military aspects. Particular attention must be paid to logistical feasibility in terms of the overall result expected as opposed to effort required.

B. Evaluation of ONC Memo T-109. (Appendix E).

(1) Examination of ONC Memo T-109 discloses little that can be classified as wholly new within the field of mine warfare doctrine. In the main, the concepts advocated in this document are extensions of existing doctrine. Two general lines of extension are followed: The first of these is the injection into mine warfare doctrine of a dynamic, active element leading to new uses of mines in deep belts, to aerial sowing and rescowing of mines, and to use of mines strategically.- This acknowledges progress in the research field and establishes definite, immediate objectives for development. These objectives appear realistic and desirable and are generally these:

- (a) Development of a wide variety of influence initiations.
- (b) Increase in the kill and damage probabilities of mines.
- (c) Provision for flexibility in means of installation.
- (d) Minimizing of detection and destruction of mines by development of:

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1. Camouflage
2. Variety in mine effects and fuzing.
3. Increases in depth of burial capability.
4. Development of nonmetallic mines and fuzes.
5. Increased durability and life of mines.
6. New and improved methods of booby-trapping mines.

(e) Provision of the maximum possibilities for friendly disarming.

(2) The second line of extension is a recognition that tactical uses of mine warfare should be imaginative and widespread: This is a reflection of what is apparently a training deficiency within the army. Published mine doctrine, and in consequence mine training, has lacked flexibility and an appreciation for the practical application of the mine's role in modern warfare. Our doctrine and our training should deal in capabilities and limitations of mines that provide guidance to all commanders rather than inflexible rules which must be blindly applied.

g. Authority of commanders. (Appendix F).

(1) Engineer personnel, technically trained in land mine warfare, are available and organic to combat divisions and higher echelons. Adequate and effective training of personnel at echelons below division will provide competent personnel for the implementation of mine warfare at all levels of command.

(2) Commanders at all levels are frequently faced with situations in which mine warfare, effectively employed, can be of material assistance in gaining ascendancy over the enemy. Flexibility of employment of the means available by the responsible commander is a fundamental principle of our overall tactical and strategic doctrine. Our manuals are written to provide the commander guidance in the proper use of the means available, based on the capabilities and limitations of that means and the dictates of the situation with which he is faced. Command decision, not dogma, must be the basis of effective mine warfare. Present doctrine does not provide latitude for the commander to employ mine warfare most effectively according to the dictates of the situation.

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4. Marking, Recording, and Reporting. (Appendix G).

(1) Marking. The primary purpose of a mine field is to act as a deterrent to enemy movement and to gain time for the user. Occasionally, surprise may be gained and a greater percentage of casualties inflicted on the enemy by not marking mine fields. In general, however, it will serve its purpose as well when marked as when unmarked, and marking will make it less of a hazard to the user's troops. Further, it is almost impossible to conceal the fact that a mine field is in existence. As a minimum, the friendly side of a mine field should be marked. The one exception to this general rule is, that often it will be neither desirable nor practicable to mark interdictory fields.

(2) Recording and Reporting. In order to arrive at sound decisions, a commander must have the most accurate and complete information that can be made available. The location of both enemy and friendly mine fields may have a major effect upon his decision. It is obvious, therefore, that recording and reporting the location of mine fields is essential. The planned location of mine fields must also be reported to all interested agencies. Detailed recording of the location of individual mines to assist in recovery is not a valid requirement; in mass mine laying, such records are of doubtful value and are therefore not a general requirement. To be practicable the report must be simple and require only essential information.

5. Terminology. (Appendix H).

(1) Present land mine warfare terminology is complicated and confusing. For example, mine fields are classified in two ways, both of which are inconsistent within themselves. Further, booby-trapped areas and temporary security use of mines can not be considered as a mine field under current definitions. This problem can be solved by an all-inclusive functional system of mine field classification. However, the terminology used must not be so inflexible as to indicate undue restriction on tactical application.

(2) A change or extension of doctrine in the use of mines or in the types of mine fields will require some revision of existing terminology.

6. Need for patterns. (Appendix I). In the siting and emplacement of mine fields, among the ever-present considerations are the possible need for future passage through, or clearance of the field and the need for making the field difficult for an enemy to breach. A degree of uniformity in impenetrability of a mine belt and the ability to lay a field with a minimum expenditure of labor are also desirable.

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Pattern mine fields offer the advantages of easier friendly passage, considerable uniformity in impenetrability, and some increases in efficiency in laying through training, but they offer the disadvantages of relative ease of detection and passage by the enemy. The advantages and disadvantages of pattern fields may be reversed and applied to random fields. The relative weights of the considerations above vary according to the field location and purpose. A completely unguarded field must be the most difficult to breach; here a method of scattering mines at random is required. In fields which must be rapidly removed or breached a pattern is required. A method of laying combining some elements of both systems is also required.

g. Staff responsibilities. (Appendix J).

(1) Staff responsibilities are determined according to primary interests. Upon analysis of staff interests, the G(S)3 is the tactical planner and is vitally concerned with the employment of mine warfare in the tactical operation and the means of incorporating its use in the overall operation plan. G(S)4 is the logistical planner, and will develop the supply requirements to support the tactical plan, to include requirements for mine warfare material. General (or unit) staff responsibilities therefore require no change from those presently established.

(2) Special staff responsibilities refer to technical supervision and supply. The Corps of Engineers now has the responsibility for technical supervision, and is qualified for this supervision by reason of the experience-background of the personnel in addition to the individual and unit training provided. The Ordnance Corps has established channels for the procurement, storage, and issue of ammunition, and the same channels are adequate for the supply of mines without disturbing the established system. Under this system, one service is responsible for mine supply. Technical supervision and supply responsibilities require no change from those presently established.

h. Target selection for aeriaily emplaced land mines. (Appendix K).
The aerial emplacement of land mines, such as the M-83 butterfly bomb or other such bombs which may be developed by the Air Force, in areas in which ground forces may operate, will be a primary concern of the ground commander. If he is not to be restricted in his later maneuver, the ground commander must have authority for the final selection of targets within his zone of responsibility. Two methods of control appear acceptable. First, he may designate a "no-mine line" or "no-mine area" similar to a bomb line. Second, he may require that his concurrence be obtained before any target within his present or planned area of responsibility can be attacked by aeriaily emplaced mines.

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These two solutions appear equally acceptable and the ground commander should be given the authority to select the method to be used in a given situation. This statement should be used as the Army position on the Joint Tactical Air Support Board.

1. Antiamphibious operations. (Appendix L). Ground defensive operations, including defense of the beach, are an Army responsibility. Defensive operations at sea are a responsibility of the Navy. Anti-amphibious operations contain an element of both, and to effectively guide the development of doctrine, technique, and materiel for anti-amphibious operations, a delimitation of the zones of responsibility must be established as is now being done for offensive amphibious operations, by joint service boards. Since the Army must also defend along inland waterways outside the sphere of interest of the Navy, and since doctrine, technique, and materiel developed against this requirement will apply in the shallow water adjacent to the beach, it appears that the delimiting line should be drawn 6 feet below furthest ebb tide. In the development of mines for use in water, advice of the Navy, based on its experience, should be available to the Army.

2. Antiairborne operations. (Appendix M). Defense against an airborne attack can be strengthened by the employment of mine fields designed specifically to counter such an attack. Mine fields so installed will be more effective if mines that are capable of attacking aircraft and parachutists just prior to their landing are included therein. Inasmuch as such a mine is not now in existence, the feasibility of developing such a mine should be investigated; further, doctrine pertaining to the use of such a mine should provide for coordination with the Air Force.

3. Logistical considerations. (Appendix N). No complete logistical analysis of this doctrine can be undertaken, since any logistical analysis to be valid, must be based on an actual situation. An approach to this problem in terms of logistic capabilities is likewise beyond the scope of this panel, since such an analysis must deal with the overall balance of production of weapons and must also consider the capabilities of probable allies to cheaply and effectively produce mines nearer to a probable point of consumption. Appendix N contains an illustrative computation of mine requirements under the recommended doctrine and indicates that this doctrine is logistically feasible in an assumed situation. The factors used in this computation are the best generally available, but are not necessarily valid. The mine fields discussed are of an arbitrarily selected magnitude and density which may not necessarily apply to any real situation and they are included merely to establish relative orders of magnitude.

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1. New developments. (Appendix O). The ability of mine fields to perform the function which is required of them by our land mine warfare doctrine is dependent upon the proper employment of the proper types of mines. Mines which will be developed in the future will increase the effectiveness of the fields in which they are employed. Doctrine recommended in this study has taken cognizance of planned and anticipated developments. It should not be necessary to expand this doctrine to fully utilize these developments.

5. **CONCLUSIONS.** That existing mine warfare doctrine is substantially sound but requires expansion. Following paragraphs state the conclusions necessary to such an expansion of doctrine.

a. The role of the mine in military operations.

(1) The primary function of a mine is to provide an obstacle to enemy movement which will assist the user in gaining the time and economy of force necessary to permit tactical and/or strategic flexibility.

(2) The casualty-producing effect of mines must be considered as secondary even though it is essential for the successful accomplishment of their primary function.

(3) Existing doctrine on the function of mines is substantially correct, however it requires expansion in order to ensure clear understanding on the part of all commanders.

b. Evaluation of ORO Memo T-109.

(1) Examination of ORO Memo T-109 discloses little that can be classified as wholly new within the field of mine warfare doctrine. In the main, the concepts advocated in this document are extensions of existing doctrine. However, it should be studied carefully in connection with the extension of mine warfare training and in connection with the review of the research and development program.

c. Authority of commanders. Commanders should restrict mine warfare activities of subordinate units only as necessary to ensure operational and administrative coordination.

d. Marking, recording, and reporting.

(1) Marking, recording, and reporting of mine fields, both friendly and enemy, is essential to ensure coordination in any operation..

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(2) Forms for recording and reporting of mine fields, both friendly and enemy, must be simplified to be practicable.

(3) Commanders authorizing the installation of a mine field must insure that the field is properly marked, recorded, and reported.

(4) Units responsible for the installation of mine fields must mark, record, and report the location of emplaced fields, and, through supplemental reports, provide higher headquarters with records which will reflect the true current status of the mine fields.

(5) Units planning the installation of a mine field must submit a report as to the planned location of that field.

(6) All units must be responsible for marking, recording, and reporting enemy mine fields upon discovery.

g. Terminology. Present mine warfare terminology is complicated and confusing and therefore should be simplified and clarified.

i. Need for patterns. The proposed tactical and strategic employment of mines creates a need for both standard and nonstandard patterns, and random methods of laying, either of which may be applicable in a given situation.

g. Staff responsibilities. Staff responsibilities as presently established are clear cut and valid. There is no requirement for change.

h. Target selection for aeriaily emplaced land mines.

(1) The ground commander concerned (normally field army or higher) must have final authority in designating targets within his present or proposed zone of responsibility against which aeriaily emplaced land mines are to be employed.

(2) Either of two methods are acceptable (designation of a "no-mine line or area" or complete restriction without specific authority), but the ground commander must have the authority to designate which method will be used in a given tactical situation.

i. Antiamphibious operations.

(1) The Joint Amphibious Board should have the mission of determining service responsibility for development of antiamphibious doctrine and technique.

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(2) The ground commander should be responsible for the installation of all types of underwater obstacles to include mines, up to a line generally defined as 6 feet (1 fathom) beyond low ebb.

(3) The Army should be responsible for research, development, and procurement of antiairborne mines with the technical assistance of the Navy.

1. Antiairborne operations.

(1) There is a requirement for a mine field designed to counter an airborne attack.

(2) There is a use for a mine capable of attacking aircraft and parachutists just prior to their landing if such a mine is found to be feasible.

(3) The Army has primary interest in the development of doctrine and techniques for the planning for and installation of antiairborne mine fields.

(4) The Army has primary interest in the development of an antiairborne mine.

k. Sample logistical analysis. No complete logistical analysis can be made of this proposed doctrine by this panel, since a logistical analysis must be based on an actual situation to be valid. However, the logistical analysis contained in Appendix E indicates that the proposed doctrine is logistically feasible.

1. New developments.

(1) Doctrine developed in this study will not be adversely affected by foreseeable future developments in mine warfare materiel and equipment.

(2) The proposed doctrine is capable of utilizing foreseeable future developments in mine warfare materiel and equipment to their maximum capability.

6. RECOMMENDATIONS.

a. That proposed changes to FM 5-32, 100-5, and 101-10 (Appendixes A, B, and C respectively) be tentatively approved and published for interim use and for comments and recommendations of all using agencies pending final publication.

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b. That agencies having Manual responsibility review the doctrine contained in appendices A, B, and C with a view toward determining its affect on the publications for which they are responsible.

g. That agencies having Manual responsibility, continue review of land mine warfare doctrine and techniques in the light of new developments to determine the affect thereon.

g. That the Army member of the Joint Tactical Air Support Board be directed to raise the question of aerially emplaced land mines and that he use appendix K for guidance on the Army position.

g. That the Army member of the Joint Amphibious Board be directed to raise the question of anti-amphibious operations and that he use appendix L for guidance on the Army position.

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APPENDICES

- A. Recommended Changes to Fm 4-32
- B. Recommended Changes to Fm 100-5
- C. Recommended Changes to Fm 101-10
- D. The Role of the Mine in Military Operations.
- E. Evaluation of GHO Memo T-109.
- F. Authority of Commanders
- G. Marking, Recording, and Reporting
- H. Terminology
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 - K. Target Selection for Aerially Emplaced Land Mines
 - L. Antiamphibious Operations.
 - M. Antiairborne Operations.
 - N. Logistical Considerations.
 - O. New Developments.

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APPENDIX A RECOMMENDED CHANGES TO FM 5-32

The following changes to FM 5-32, "Land Mine Warfare", are recommended:

1. Delete paragraph 14, Chapter 1.
2. Delete Chapter 3, "American Mine Warfare Policies and Tactics", substituting therefor Chapter 2, "US Mine Warfare Doctrine", as contained in Inclosure 1 of this appendix.
3. Delete Appendix I, "Mine Warfare Training".
4. Add Appendix I, "Glossary", as contained in Inclosure 2 of this appendix.

Incl 1 - Recommended changes to FM 5-32
Incl 2 - Glossary (App 1 FM 5-32)
3 Figs - (Types of Mine Fields)

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INCLOSURE 1 TO APPENDIX A

RECOMMENDED CHANGES TO FM 5-32

Chapter 2

UNITED STATES MINE WARFARE DOCTRINE

Section I. GENERAL

14. BASIC DOCTRINE

Mine warfare is the employment of mines against an enemy and the countermeasures employed against hostile use of mines. Mine warfare is concerned primarily with the use of mine fields to provide an obstacle to enemy movement which will assist the commander in gaining the time and economy of force necessary to permit tactical or strategic flexibility. The casualty-producing effect of an individual mine is secondary even though it is essential for the successful accomplishment of the mine's primary function. The basic doctrine of US mine warfare is based on the following principles:

- a. Mine fields are active obstacles placed to improve the protection of units in defense and for the protection of the flanks and rear of units engaged in an attack or defense.
- b. The proposed location of planned mine fields must be reported to higher headquarters and immediately upon completion a location and lane report must be submitted.
- c. The location of enemy mine fields must be reported to higher headquarters as soon as discovered.
- d. All combat, supporting, and administrative troops must be adequately trained and able to install antitank and antipersonnel mines.
- e. All commanders, in formulating plans for employment of mines, will consider all aspects of the situation to include the overall scheme of maneuver, the enemy capabilities, the logistical effort required, the fire support plan, the overall barrier plan, and, if applicable the political and economic implications.

15. TRAINING

Effective application of mine warfare is dependent upon a thorough knowledge of doctrine and techniques by all commanders, staff officers, and individuals. The application of mine warfare, if not based on thorough knowledge and training, may react upon the user as markedly as upon the enemy. Intimate knowledge of mine warfare requires thorough, up-to-date, realistic training and continued retraining. Knowledge must be maintained active by a

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continuing play of mine warfare in unit exercises, maneuvers, and map exercises. It is essential that every soldier be trained not to fear mines but to respect them. He must be trained to recognize mines and to use them to provide his security. All combat troops, as well as engineers and mine specialists must be trained in the laying and breaching of mine fields, in the marking and reporting of mine fields, and in all associated techniques including allied and enemy mines. This training is necessary for the combat arms in order that they will be capable of protecting themselves without reliance on the availability of engineers or specialists. Every commander must be held responsible for the mine discipline of his troops. It is inexcusable for any commander to direct the installation or removal of any mine field by troops who have not been fully trained in mine warfare.

Section II - CLASSIFICATION AND EMPLOYMENT OF MINE FIELDS

16. CLASSIFICATIONS

a. Functional mine fields.

Mine fields are classified functionally as follows:

- (1) Security
- (2) Defensive
- (3) Barrier
- (4) Interdictory
- (5) Deceptive

b. Definitions of functional mine fields.

The following are the definitions of functional mine fields.

(1) Security mine field. A security mine field is one which provides local protection for small units.

(2) Defensive mine field. A defensive mine field is one installed to improve the defensive positions of battalions, regiments, and divisions.

(3) Barrier mine field. A barrier mine field is installed to complete the overall defense plan of large units.

(4) Interdictory mine field. An interdictory mine field is one which hinders the enemy use of an area or route which cannot be covered by supporting ground fire.

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(5) Deceptive mine field. A deceptive mine field is a simulated mine field used in place of other type mine fields or in conjunction with them to economize on time, labor, and material or to camouflage lanes.

c. Definition by type. Mine fields may be further defined by the type of mine which predominates within the field. For example, an anti-tank defensive mine field is a defensive mine field which contains primarily antitank mines.

17. SECURITY MINE FIELD

a. Purpose. A security mine field provides a rapid means of improving the defense of a small unit. It affords local protection against enemy infiltration, small-unit armored or infantry attacks, and surprise.

b. Description. A security mine field may consist of one or more groups of antitank and antipersonnel mines installed by small units in front of or around their defensive position and across likely avenues of enemy approach into the position. All mines or groups of mines are covered by small-arms and direct-fire weapons.

c. Authority to install. All unit commanders are responsible for the local security of their units. A security mine field is one of the means available to a unit commander for insuring local security and preventing surprise by the enemy. Commanders of all units down to company level, have authority to install security mine fields for local security, unless such authority is reserved or revoked by a higher commander.

d. Planning. Before a commander makes the decision to employ mines for local security, careful consideration must be given to his future plans, the local situation, the mine training of his unit, the availability of mines, and the avoidance of friendly casualties due to the use of mines. He must plan when and where mines will be employed, the types of mines to be used, and coordination with other plans.

(1) When employed. A security mine field may be used when a unit halts to consolidate its position and to reorganize prior to resuming the attack; when on the defensive or on an independent or isolated mission such as a detached post, outpost, working party, or defense of a road block; or when it is a reserve, supporting, or administrative unit behind the front lines or in a reserve area.

(2) Where employed. A security mine field may be laid by small units for all-around protection or for protection to front, flanks or rear, to cover likely avenues of enemy tank or foot-troop approach. All mines must be covered by small arms fire. They must be located beyond hand grenade range and so that adequate warning of enemy approach is given to listening posts and observation posts in time to alert all members of the unit.

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(3) Types of mines. Antipersonnel mines, as well as antitank mines, may be used for security mine fields. Mines may be buried or concealed above ground; however, they must be placed so that they are readily removable by the unit installing them. This precludes the use of specialized types of mines, fuses, and devices in a security mine field. All mines planned for use in a security mine field must be readily detectable by a standard mine detector. Trip flares may be installed and noise devices may be devised and used to give warning of enemy approach during periods of poor visibility.

(4) Coordination and control. A commander of any unit planning installation of a security mine field must be well-informed of future plans and constantly aware of the local situation. Full coordination with commanders of outposts, friendly patrols, adjacent units, and all other units likely to enter the area is of the greatest importance to avoid friendly casualties. It is essential to plan and insure that approaches into a security mine field are clearly defined or guarded. Warning must be given to all friendly personnel, including outposts, patrols, and withdrawing security forces, of the location of the mine field or groups of mines and of the safe lanes through or around them. The next higher commander and other interested units must be immediately informed of any planned installation of a security mine field so that its installation can be coordinated with future plans. Timely information of future attack, defense, or withdrawal plans; demolitions plans; and other mine field plans must be transmitted to units installing security mine fields to afford time to remove installed mines or adjust plans accordingly.

e. Execution of plans. Any unit commander who installs a security mine field is responsible for its protection by fire, for guarding it against friendly casualties, and for full coordination with friendly units likely to enter the area where the mine field is located. He will be held directly responsible for laying, marking, recording, reporting, and removal of the mine field.

(1) Installation. To avoid being surprised by the enemy during installation of a security mine field, the responsible unit commander will insure that the location of the field is adequately protected and covered by fire. He will insure that adequate lanes through or around the mine field are left for the use of patrols and covering forces and for friendly troops entering and leaving the position. It is not mandatory that mines be installed according to set patterns in a security mine field; however, it is essential that all mines be accurately located on the ground for future removal. Any unit commander installing a security mine field is directly responsible for its removal after it has served its purpose or before leaving the position, unless a relieving unit commander assumes such responsibility by signing a written report to that effect.

(2) Marking. Security mine fields will be marked in conformance with the standard marking method prescribed by paragraph 47 to prevent

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casualties to friendly troops. When approved mine-marking equipment is not available or cannot be brought up in time, field expedients will be utilized to avoid friendly casualties.

(3) Recording. Careful notation of all mines will be made by the commander of each unit installing a security mine field. Several individuals must be fully cognizant of the exact locations of mines on the ground and the type of firing devices being used for each, so that they can remove the mines should those who installed them become casualties.

(4) Reporting. A report of the location of security mine fields will be made in accordance with paragraphs 46 and 48 by the installing unit commander to the next higher commander. This report will include an overlay or sketch of the mine field. Each echelon receiving such reports will consolidate and forward them to the next higher commander, up to the division level.

(5) Removal.

(a) All mines, both antitank and antipersonnel, used in security mine fields will be removed by the installing unit either prior to departure from the area or when the mines have served their purpose, unless a relieving unit commander specifically requests them to be left in place.

(b) A removal report consisting of a revised location report will be prepared and forwarded to the next higher commander by the unit removing the mines. These reports will be consolidated and forwarded by each echelon up to the division level.

(c) In cases where it has been specifically requested that the mines be left in place, actual location of all mines will be pointed out on the ground to the relieving unit by the units being relieved and records will be turned over to the relieving unit commander. A written message to this effect will be prepared and signed by both commanders and sent to the next higher commander of both the relieved and relieving commanders. These reports will be consolidated and transmitted by each echelon in turn to the next higher commander up to the division level.

18. DEFENSIVE MINE FIELD

a. Purpose. A defensive mine field is usually installed for the purpose of improving the obstacle plan in front of or on the flanks of a battalion, regimental, or division sector or zone in order to delay, disorganize, and canalize enemy attack formations or to protect the flanks from enemy counterattacks.

b. Characteristics. A defensive mine field is characterized by one or more antitank or antipersonnel mine belts laid across the front or flanks

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of a unit, tied in to other artificial as well as natural obstacles, and protected by small-arms fire and the fires of organic and supporting weapons.

c. Authority to install. Battalion or higher commanders have authority to install defensive mine fields unless such authority is reserved or revoked by the next higher commander. Immediately after making a decision to install a defensive mine field, the commander will notify the next higher commander by the most expeditious means available and consistent with security. This information will be transmitted by each echelon to the next higher echelon up to and including army level.

d. Planning. Every authorized commander who makes the decision to install a defensive mine field is responsible for insuring that the plan for installation is fully integrated and coordinated with all other local plans.

(1) When employed. Defensive mine fields may be employed when a unit is on the defensive to assist in the prevention of enemy penetration, or when its attack has been halted to protect against enemy counter attack. They are usually laid out of range of enemy ground observation and fire and before security echelons have been withdrawn. They may, however, be laid while in contact with the enemy but then only at night or during periods of poor visibility and under cover of defensive fires.

(2) Where employed. Defensive mine fields are sited to cover likely avenues of infantry or tank approach and where they can be fully covered by small-arms fire and fires of direct and indirect-fire weapons. They may be installed in one or more mine belts, in front of or in rear of the final protective barriers of the main line of resistance, where they are covered by the final protective fires of the battle position. They may be located on the flanks of the battle position or on the flanks of an attacking unit to afford protection from enemy development or counterattack. They are sometimes used in rear positions of a defensive sector to add depth to the battle position and to protect against likely penetrations as well as infiltration, guerrilla, and airborne attacks. They may also be installed on the beaches of rivers, lakes, and the ocean and augmented with antiamphibious mine belts to repel enemy river or lake crossings and amphibious landings. Wherever laid, defensive mine fields are usually buried or covered and camouflaged. They will be laid in accordance with standard patterns prescribed by paragraph 38 b. Scattered laying of mines in a defensive mine field is prohibited, except in the area within 100 yards forward of the most forward belt of a defensive mine field.

(3) Types of mines. All types of antitank and antipersonnel mines, including nondetectable mines and mines using varied types of fuzes

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may be employed in a defensive mine field. Antipersonnel mines may be superimposed upon antitank mine belts or installed in separate antipersonnel mine belts forward of, in rear of, or between antitank mine belts. Use of special purpose mines with nondetectable, and antilift devices must be carefully weighed against hazards to friendly troops and planned future operations. Higher commanders must place restrictive limitations on the use of special types of mines if future plans are likely to be affected. Warning devices such as trip flares, smoke streamers, and noise devices should be used in defensive mine fields to warn of breaching attempts by the enemy.

(4) Coordination and control.

(a) Defensive mine fields must be carefully coordinated and integrated with the fire-support plan, the antitank defense plan, and the counterattack plans of local reserves. As part of the barrier plan, they must be tied in closely with demolition plans and with other artificial and available natural obstacles to cover likely enemy approaches into a position. Close coordination between adjacent units and dissemination of information to all echelons is essential to avoid friendly casualties. Information of attack, defense, or withdrawal plans; demolition plans; and other barrier plans must be disseminated early enough so that units responsible for protection, installation, or breaching of the defensive mine field can make adequate plans and preparations well in advance of impending operations.

(b) Higher commanders must place restrictions on the issue or employment of special types of mines and fuzes if their use is likely to affect future operations or cause friendly casualties. Commanders of all units authorizing or installing defensive mine fields must make certain that adequate lanes are left and coordination is effected with security echelons, patrols, and reserve forces to permit them to fully accomplish their missions. Closing of such lanes must be as carefully planned and coordinated as the demolition of critical bridges in retrograde operations.

(c) Continuing and unrelenting surveillance of defensive mine fields through the aid of warning devices, listening and observation posts, aerial observation, and active patrolling must be planned. This is essential to provide timely intelligence of enemy breaching operations and to permit defensive preparation against impending attacks by the enemy. Such information, properly evaluated and disseminated, assists materially in avoiding surprise attacks by the enemy.

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g. Execution of plans.

(1) Installation. Any commander with authority to lay a defensive mine field may delegate responsibility for actual installation of the mine field to any subordinate unit commander organically assigned, supporting, or attached to his command. Where possible, the responsibility, control, and supervision should be delegated to commanders of engineer units augmented or assisted by other combat, supporting, or administrative troop units.

(2) Protection. Each unit commander installing a defensive mine field is responsible for its protection by small arms and other weapons unless otherwise directed. Upon completion of the installation, protection of the defensive mine field comes automatically under the control of the combat unit commander in whose sector the mine field or portion thereof is located. If the mine field is on the flank or rear and outside of the boundaries of a front-line combat unit, responsibility for its protection will be delegated by the commander who authorized the installation.

(3) Marking. All defensive mine fields and the safe lanes through them will be adequately marked in conformance with the standard marking method prescribed by paragraph 47. Marking fences and signs forward of a mine field or belt may be removed after security forces have been withdrawn.

(4) Recording and Reporting. The commander responsible for installing a defensive mine field or any portion thereof is responsible for the proper recording and reporting in accordance with the procedures prescribed in paragraphs 40-43. As a minimum, location and lane records and reports will be prepared and submitted. Copies of the reports are forwarded to the commander authorizing installation of the mine field. The commander authorizing the installation consolidates the reports and forwards them to the regimental, division, corps, and army headquarters. The commander authorizing the installation of a defensive mine field is responsible for its records and their distribution. The commander who installs the mine field is responsible for marking the field. Sufficient local records are kept by the installing unit to permit hasty breaching, change of safe lanes, and transfer of information to a relieving unit. The relieving and the relieved unit commanders will both sign copies of a statement to the effect that the records have been transferred to and accepted by the relieving unit commander. Signed copies of the statement will be forwarded to the next higher commanders of both the relieving and the relieved unit commanders.

19. BARRIER MINE FIELD

a. Purpose. A barrier mine field is employed to delay, disorganize, disrupt, and annihilate large-scale enemy attacks and to require

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the enemy to concentrate his forces in areas covered by massed defensive fires, including atomic weapons and guided missiles, where maximum casualties may be inflicted upon him before and during his attack.

b. Characteristics. A barrier mine field is characterized by its maximum resistance to breaching or passage by the enemy. It may consist of numerous mine belts emplaced laterally and axially to the front to canalize the enemy in his approaches to the position and to cover the wide intervals between defensive strong points or centers of resistance. It includes large-scale mine fields laid on the flanks of large units to protect them against wide enemy envelopment or counterattacks. Mine belts are anchored to other major artificial and natural obstacles to complete the overall barrier plan of a large unit or units.

c. Types of barrier mine fields. Barrier mine fields are classified as tactical and strategic.

(1) Tactical barrier mine fields may be employed in great depth and density to cover the wide intervals between strong points on a wide-front defense. This use canalizes and delays the enemy and provides time for the defender to concentrate fires in the wide intervals between strong points and to move mobile reserves to repel an enemy offensive. It may deter the enemy from attempting an attack through the intervals and around the flanks of strong points and force him to choose a frontal attack against well-defended strong points.

(2) Strategic barrier mine fields are barrier mine fields of such magnitude that they have strategic significance. They may be planned in advance as strategic barrier mine fields to cover the front or flanks of large units in great depth, or they may be derived from a combination of tactical barrier mine fields employed by a number of units which become so extensive that they are of strategic importance and thus are termed strategic barrier mine fields.

d. Authority to install.

(1) Division and higher commanders have authority to install tactical barrier mine fields unless such authority is reserved or revoked by a higher commander.

(2) Only a theater or higher commander has authority to authorize a strategic barrier mine field.

e. Planning.

(1) General. Every authorized commander who makes the decision to install a barrier mine field is responsible for insuring that the plan for installation is fully integrated and coordinated with all other

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plans. A barrier mine field requires great military foresight in planning. If planned to afford maximum delay to the enemy, it will also present maximum difficulties to the commander who authorized its installation should he find that he must breach his own mine field to attack or pursue the enemy. A barrier mine field may also present the commander who orders its installation with political, economic, and psychological factors which must be carefully weighed and considered before he makes the decision.

(2) When employed. Barrier mine fields may be planned and installed prior to the outbreak of hostilities, when it appears that war is imminent and that a prolonged defense is necessary at the outset of the war. If installed prior to the outbreak of hostilities, barrier mine fields can usually be prepared secure from enemy air observation and fire as well as secure from enemy ground observation and fire. They are, however, subject to enemy espionage and possible sabotage. If installed after hostilities begin, they may be prepared in areas protected temporarily from enemy ground observation and fire, but it may not be possible to protect them from enemy air observation and fire.

(3) Coordination and control. Barrier mine fields must be sited carefully in conformity with fire support plans. They must be anchored to other artificial as well as natural obstacles to complete a continuous barrier plan or one which will canalize the enemy into the most lucrative concentration areas covered by massed fires of the defender's supporting weapons. Barrier mine fields may be laid on the flanks and in rear of large units in the attack to protect against counterattack by highly mobile enemy reserves, or in the defense to protect against airborne, ground, or amphibious enveloping attacks. Highly mobile reserves must be available to cover these fields by fire when the need arises. All barrier mine field plans must be carefully integrated with future offensive plans, counterattack plans, withdrawal plans, and other mine field, barrier, obstacle, and demolition plans. Lanes must be left for the withdrawal of security forces and provision made to fully coordinate closing the lanes immediately after withdrawing troops have cleared each belt. Continuous surveillance by all units of those portions of the barrier mine field in their sector is of paramount importance. Plans must include use of special warning devices, and the detailed observation of critical routes of enemy approach through the use of active patrols, listening and observation posts, and aerial observation. Prompt reporting by all defensive agencies of enemy activity and breaching operations in the barrier mine field affords the higher commander timely intelligence for use in evaluating any imminent large-scale offensive by the enemy.

(4) Types of mines and special employment. Various types of antipersonnel and antitank mines and fuzes may be used in a barrier mine field including nondetectable mines. Special types of fuzes, and devices

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add to the difficulties of enemy breaching operations. However, extensive use of special types of mines, fuzes, and devices may increase the requirement for trained specialists beyond installing unit capacities. Anti-personnel mines may be superimposed upon antitank mine belts or installed in separate antipersonnel mine belts forward of, in rear of, or between antitank mine belts. Standard or nonstandard patterns may be employed in all mine belts. Scattered antipersonnel and antitank mines may also be sown within or between mine belts. Such use confuses the enemy and delays removal of mines as well as increases the possibility of inflicting heavy casualties and provides a psychological deterrent to enemy breaching parties. If the enemy is successful in breaching one or more belts, timely intelligence might enable the commander to relay the breached sections with antipersonnel or antitank mines by the use of patrols, aircraft, or other suitable means at his disposal. If the enemy succeeds in launching an attack after breaching a mine field, aircraft or other suitable means might be used to resow or vastly increase the density of mines in the zone of enemy attack. This will tend to delay or demoralize the attacking forces and prevent him from reinforcing assault echelons with supporting and reserve units. All such plans for the use of special types of mines and special employment of mines must be carefully weighed with planned future operations requiring the eventual use of mined areas to avoid casualties to friendly troops. Higher commanders must place restrictive limitations on the use of special types of mines and on indiscriminate or random sowing of scattered mines if future operations are likely to be affected adversely.

f. Execution of plans.

(1) Installation. Responsibility for planning and laying a barrier mine field may be delegated to any unit or units by the commander authorized to order the installation of such a mine field. Normally the commander ordering the barrier mine field will have the overall plan prepared in his headquarters. Units charged with the responsibility for installing the mine field or portions thereof will coordinate their efforts to the fullest extent to insure conformity with the overall plan. Responsibility for the actual laying of a barrier mine field may be assigned to any unit or units using troops and indigenous labor. The organization of all troop units and labor engaged in laying a barrier mine field will be coordinated and supervised under engineer control.

(2) Protection. Each unit commander engaged in installing a portion of a barrier mine field is responsible for its protection, unless otherwise directed. Upon completion of the installation, protection comes automatically under the control of the combat unit commander in whose sector that portion is located. If the mine field is on a flank or in rear of and outside of the boundaries of a front-line combat unit, its protection will be directed by the commander who authorized the installation.

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(3) Marking. Each barrier mine field and each safe lane through it will be adequately marked in conformance with the standard marking methods prescribed in paragraph 47. Marking fences and signs forward of a mine field or mine belt may be removed after security forces have been withdrawn.

(4) Recording and reporting. Commanders of units responsible for installing portions of a barrier mine field are responsible for the proper recording and reporting in accordance with the procedure prescribed by paragraphs 46-48. As a minimum, location and lane records and reports will be prepared and submitted. Copies of the reports are forwarded to the commander authorizing the installation of the mine field. The commander authorizing the installation of a barrier mine field is responsible for its records and their distribution. Enough local records are kept by the installing units to permit changing safe lanes and to facilitate transfer of information to a relieving unit. The relieving and the relieved unit commanders will both sign copies of a statement to the effect that the records have been turned over to and accepted by the relieving unit commander. Signed copies of the statement will be forwarded to the next higher commanders of both the relieving and relieved unit commanders.

20. INTERDICTIONARY MINE FIELDS

a. Purpose. An interdictionary mine field provides a means of hindering or preventing enemy use of an area or route.

b. Description. An interdictionary mine field may consist of few or many mines of standard and improvised types. These mine fields may be used by large or small units in either a strategic or tactical role. They are not normally covered by ground fire.

c. Authority to install. Army commanders and higher are authorized to order the installation of interdictionary mine fields. This authority may be delegated or revoked as considered necessary.

d. Planning. In planning interdictionary mine fields, the primary consideration must be given to the future plans of friendly forces. Inherent in the plan must be either an assumption or the knowledge that friendly forces will not be required to operate in the area to be mined within a specified period of time. If it is not intended to use the area in the near future, planning need give little consideration to the ability to neutralize friendly interdictionary mine fields. Planning the installation of interdictionary mine fields designed to aid a tactical operation must be initiated at the command level directing the operation. Like other types of mine fields, the interdictionary mine field will be included in the barrier plan of the command. Planning for mining operations with strategic significance will be initiated at theater level. However, the detailed planning

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and execution of these operations will be a responsibility of subordinate units.

(1) When employed. Interdictory mine fields are employed tactically to harass the enemy's support elements as well as his combat troops. These mine fields may be profitably employed in the conduct of a retrograde movement, a position defense, a counterattack, and other basic tactical situations. When employed strategically, interdictory mine fields prevent enemy utilization of very important facilities which may fall into his hands or which are already in his hands. This employment of mine fields will frequently arise from the denial policy of a theater commander or higher. Such a policy may also permit the execution of a "scorched earth" or a more limited type of denial operation. It is in the conduct of a limited denial operation that mine fields have their most widespread strategic application; however, they may also be employed in the conduct of a strategic evacuation and strategic bombardment.

(2) Where employed. In general, interdictory mine fields are sited in areas and across routes which the enemy will be most likely to use. Specific operations employing interdictory mine fields include:

(a) Retrograde movement. During or just prior to the conduct of a retrograde movement, the interdictory mine fields may be installed across enemy avenues of approach and within certain important areas. When so employed they render these areas temporarily untenable, deny access to the areas, and restrict movement in any direction through the areas. Suitable locations for installation are roads and trails, bivouac areas, water points, command posts, and similar positions likely to be occupied by the enemy.

(b) Position defense. While occupying a defensive position, interdictory mine fields may be employed in rear of the enemy's positions. Such a use is analogous to the employment of artillery for interdiction. The sites for these installations will be similar to those selected during a retrograde movement. Intelligence may make the selection of enemy occupied sites possible. Aerially emplaced mines will normally be the most effective. However, the possibility of using patrols, guerrillas, and partisans to emplace mines to the enemy rear must not be overlooked.

(c) Counterattack. Assistance in the execution of a counterattack designed to restore our lines can be rendered by the use of interdictory mine fields. These mine fields will be installed in the vicinity of the base of an enemy's penetration and outside of the area which our troops plan to reoccupy. Such use of mines will assist in preventing enemy movement of reinforcements and supplies into the penetration at the most critical stage of his offensive. Emplacement of the mines by air or other means will be necessary.

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(d) Denial operation. The installation of interdictory mine fields is an important adjunct to the execution of a strategic limited-denial operation. Such an operation has the function of preventing enemy utilization of important facilities by removal, destruction, or denial. The effectiveness of the partial destruction of important installations such as petroleum tank farms, railroad terminals, hydroelectric plants, timber stockpiles, major bridges, and airfields will be greatly enhanced by interdictory mine fields. The emplacement of these fields may occur well in advance of a projected withdrawal if the facilities are not in use. In any case, considerable time will be required for their effective emplacement.

(e) Evacuation. Prior to the forced or voluntary evacuation of an area as the result of tactical or strategic considerations, interdictory mine fields may be installed for the sole purpose of creating a nuisance to future occupants of the area. Booby traps and dirty-trick devices will find widespread application in this instance.

(f) Deep aerial emplacement. Aerially emplaced interdictory mine fields can be employed to supplement strategic bombing. Conventional bombs and atomic bombs rely upon complete destruction to accomplish the mission of preventing the enemy from supporting his combat forces. Political, economic, psychological, and practical considerations may make it desirable to minimize the damage inflicted upon enemy facilities. In this event, the saturation of strategic industrial complexes and residential communities with aerially emplaced mines may effectively retard production without causing extensive damage.

(3) Types of mines. Interdictory mine fields may be expected to restrict the movement of enemy motor vehicles, locomotives, boats, and airplanes as well as personnel. Hence, these mine fields may contain anti-tank, anti-rail, anti-amphibious, anti-airborne, and anti-personnel mines. All types of conventional and nonconventional mines and firing devices, dirty-trick devices, and booby traps should be used to the maximum extent consistent with the purpose of the field and the time and material available. In the event future plans contemplate a return to the mined area within a specific time period, the mine field may contain special features which may render it ineffective prior to the time of return to the area. The effectiveness of interdictory mine fields will be largely determined by the ingenuity of the troops installing the field.

(4) Coordination and control. Interdictory mine fields require high-level coordination and integration with future plans. Tactical employment of interdictory mine fields must be considered as a part of the operation plan and must be coordinated with the elements thereof. If the employment of an interdictory mine field will be of strategic significance, consideration must be given to the political and economic policies of the theater of operations. Particularly important is the coordination with

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the air commander when mines are to be serially emplaced close behind the enemy rear. The ground commander must have final approval of target selection in this instance. Control of aerial mining may be effected by the designation of a "no-mine line" or "no-mine area" which serves the same purpose as the conventional bomb line.

c. Execution of Plans.

(1) Installation. Any commander with authority to lay an interdictory mine field may delegate responsibility for actual installation of the mine field to any subordinate unit commander organically assigned, supporting, or attached to his command. Where possible, the responsibility, control and supervision should be delegated to commanders of engineer units augmented or assisted by other combat, supporting, or administrative troop units. Interdictory mine fields may be laid to pattern in the interest of speed. However, scattered or random laying is preferable because of the added difficulty of removal by the enemy. Security, defensive, barrier, and deceptive mine fields are considered interdictory mine fields after they have fallen into enemy hands.

(2) Protection. Coverage by fire is not a prerequisite of an interdictory mine field. On the other hand, such fields installed in the course of a retrograde movement should be covered by fire for as long as the range of available weapons permits. Upon completion of the installation, protection and maintenance of the interdictory mine field comes under the control of the commander in whose sector the mine field is located for as long as it can be covered adequately by fire.

(3) Marking. Marking of an interdictory mine field is not required unless it will endanger the safety of our own troops prior to the time that it is expected to fall into enemy hands. The commander ordering the installation of the field will specify the extent of marking to be used. When marking is required, standard markings as prescribed by paragraph 47 will be used. Markings may be removed after withdrawal of security forces.

(4) Recording and reporting. The commander ordering installation of an interdictory mine field is responsible for proper recording and reporting of the mine field. The commander physically installing the mine field is responsible for preparing the required records and reports except that serially emplaced mine fields will be recorded and reported by the installing Air Force commanders to the concurring ground commander. A location record and report will be prepared for each interdictory mine field. A detailed record may be required at the discretion of the commander ordering the installation. A copy of each record will be retained by the commander making the installation. The commander authorizing or ordering

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the installation of an interdictory mine field is responsible for consolidation of records and their distribution to each higher and lower echelon.

21. DECEPTIVE MINE FIELD

a. Purpose. A deceptive mine field is used to perform the functions of security, defense, barrier, and interdictory mine fields or to provide lanes through those fields.

b. Description. A deceptive mine field is a simulated mine field. It may contain some live mines or it may contain only dummy or simulated mines.

c. Authority to install. Deceptive mine fields may be authorized and installed by any commander.

d. Planning. The effectiveness of a deceptive mine field depends upon its degree of resemblance to a live mine field.

(1) When employed. Deceptive mine fields are employed when time, effort, or material do not permit installation of normal mine fields or when it is desired to camouflage a lane through a mine field.

(2) Where employed. Deceptive mine fields will normally be used in conjunction with larger mine fields; that is, they will supplement or extend live fields and will seldom be used alone. They frequently serve as lanes in existing mine fields. Deceptive fields may also be considered as temporary expedients to be replaced as soon as the factors which required their installation become invalid.

(3) Types of mines. Both antitank, antipersonnel, and other types of mines may be exploded, in a deceptive mine field. Dummy mines or scrap metal may actually be exploded, or the earth may simply be disturbed at the point where a mine would have been placed.

(4) Coordination and control. The same degree of coordination and control will be required for a deceptive mine field as is required for the conventional mine field which it is designed to simulate.

(5) Marking, recording, and reporting. Standard marking, recording, and reporting procedures required for the mine field which is being simulated will be used.

(6) Protection. Deceptive mine fields should be covered by fire to be most effective; however, they can only be given the fire coverage accorded the type of mine field which they simulate. Deceptive mine fields used as part of a barrier or interdictory mine field will frequently not be covered by fire.

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22. DEFENSE OF MINE FIELDS

a. Plans must be made to cover all mine fields, except interdiction mine fields, with direct or indirect-fire weapons. Mine fields which cannot be protected by fire are susceptible to rapid breaching and clearance by the enemy and must be considered interdiction mine fields.

b. Outposts or listening posts may be placed in front of or in rear of a mine field or in a mine field itself to prevent enemy patrols from discovering the location of its forward edges, determining the direction and extent of the mine belts, and removing portions of the field. They may also be used to give timely warning of enemy breaching operation and to adjust mortar or artillery fire on enemy breaching parties when their own fire is inadequate to disperse the enemy.

c. The cellular nature of mine field installation tends to guide enemy attacks into pockets surrounded by mine fields. This delays the enemy, who can then be destroyed by heavy concentrations of artillery and mortar fire followed by a counterattack launched through concealed lanes in the mine fields.

23. DEVELOPMENT OF MINE FIELDS

In most situations, defensive operations are forced on a unit by a stronger enemy force. Rarely are defensive operations planned and executed without the presence of the enemy and without his interference unless accomplished prior to the opening of hostilities.

a. When an attacking unit has been slowed down or halted, it is unlikely that the duration of the defense will be known. During the initial organization of the ground, the unit places security mine fields which cover likely avenues of enemy approach. These mines are placed hastily, and may or may not conform to a pattern.

b. If the defense is prolonged, the unit may request that additional mine fields be installed, or it may be ordered to install additional mine fields for protection. The installation of defensive mine fields which are laid in standard pattern, may be supervised by unit engineers to insure that the fields are properly installed, marked, and recorded.

c. When the defense is to be further prolonged, a barrier mine field plan coordinated with an organized defense is formulated and issued from division or higher levels. Existing mine fields, including reported enemy fields, are utilized as much as possible in this plan. The existing mine fields, plus additional fields installed to complete the overall defense plan may become barrier mine fields.

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Section III. GENERAL CONSIDERATIONS

24. SITING OF MINE FIELDS

a. General. In determining the siting of mine fields in a given situation, the commander must first give consideration to his mission and planned future operations. Among other factors which he must consider are the number and type of mines available to him, the troops available for mine laying and conduct of the operation, and the obstacle value of the terrain within the area. Thorough reconnaissance is essential to the effective employment of mines.

b. Basis principles.

(1) Coordination. Coordination is necessary between the organization installing the field and the unit responsible for guarding and protecting it. During installation, the mine field should be sited in terrain that can be covered effectively by protective small-arms, mortar, artillery, and antitank-gun fire.

(2) Utilization of terrain. Effectiveness of a mine field is increased by laying it on terrain which the enemy either cannot observe or has difficulty in observing. Mine field frontage is reduced to the minimum by making maximum use of natural obstacles and by restricting the mine field to terrain which can be covered effectively by defensive fire. To be effective, the mine field must be anchored to natural or other artificial obstacles to prevent the field from being outflanked, or it must be sited so that bypassing the field would result in more work or be more hazardous than breaching the field.

25. MINE FIELD LAYING

Individual mines may be emplaced in a definite geometric pattern or they may be laid without regard to the location of other individual mines. Both pattern laying and nonpattern laying have distinct advantages:

a. The advantages of pattern laying are:

- (1) Increases efficiency and speed of installation.
- (2) Insures thorough coverage with uniform density.
- (3) Requires the minimum number of personnel at one time.
- (4) Makes recording of the field easier.
- (5) Facilitates location and clearing of the field.

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(6) Facilitates training of personnel.

(7) Increases adaptability to mechanical mine laying.

b. The advantages of nonpattern laying are:

(1) Increases the difficulty of breaching and clearance by the enemy.

(2) Increases flexibility, in that the density and depth can be more readily adapted to the character of the terrain.

c. The function of the field will determine the method to be employed in laying the field. Standard mine field patterns are described in paragraph 18. All personnel must be trained in laying these patterns.

26. ANTITANK MINES

Antitank mines are the most common type employed in land mine warfare. They are employed when the enemy has the capability of attacking friendly positions with track or wheeled vehicles. All combat troops must be capable of installing all types of antitank mines. Security, defensive, barrier, interdiction, and deceptive mine fields will normally include antitank mines.

27. ANTIPERSONNEL MINES

Antipersonnel mines may be installed in conjunction with other types of mines, or they may be the only types of mines in a field. Since antipersonnel mines are extremely dangerous to friendly personnel, commanders should specifically authorize or restrict their use in all types of mine fields. Installing specialized antipersonnel mines and activating mines using specialized devices and fuses is highly specialized work and must be performed by highly trained troops. Antipersonnel mines may be employed in the following specific ways:

(1) Singly or in fields in front of battle positions.

(2) Placed in woods, gullies, and defiles to provide warning of enemy approach.

(3) Placed in areas or in buildings or facilities to deny enemy use thereof.

(4) Attached to artificial obstacles and other mines to inflict casualties upon the enemy who attempts to clear or breach them.

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(5) Set as booty traps so arranged that any disturbance of a seemingly harmless object sets them off.

28. ANTIAMPHIBIOUS MINES

Antiamphibious mines are laid below the high-water line for the purpose of destroying enemy landing craft and personnel. They are installed under water along ocean beaches, river banks, and lake shores. Anti-amphibious mines are laid in conjunction with conventional antitank and antipersonnel mine belts which are installed on the beach or banks above the high-water mark, and with naval mines installed in the deep-water approaches. Antiamphibious mine belts may be part of security, defensive, barrier, interdictory, and deceptive mine fields.

29. ANTIAIRBORNE MINES

Antiairborne mines are employed to prevent the safe landing of enemy aircraft and parachutists. They are installed as part of an overall defense against enemy airborne operation. They may be standard or improvised mines of all types as well as specially developed antiairborne mines. Security, defensive, barrier, and deceptive mine fields may be used for defense against airborne attack.

30. MARKING OF MINE FIELDS

To prevent casualties to friendly troops, all mine fields, including deceptive mine fields and enemy mine fields that have been overrun by friendly troops or incorporated in our defense positions, must be marked in a manner known to all personnel. Precautions must be taken to prevent troops from entering mine fields being installed and marked. Interdictory mine fields may or may not be marked.

a. Responsibility.

(1) Marking. Troops laying the mine field are responsible for marking the field as it is installed.

(2) Maintenance. Sectors of responsibility for maintenance of marking fences are specified by the commander of the area in which the mine field is situated.

b. Marking of lanes and gaps. Lanes and gaps must be provided to permit passage of vehicles and troops through mine fields. The method prescribed in paragraph 47 for marking safe lanes through mine fields is also used for marking gaps breached through enemy mine fields. When a mine field is breached on a road, standard mine-road-clearance signs are used to mark safe lanes.

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c. Withdrawal. During a withdrawal, the lanes through mine fields must be closed as soon as all personnel have passed. The defense plan must be clearly understood by the unit responsible for closing the lanes. Sufficient warning must be given the unit responsible for closing lanes so the work can be done quickly and effectively.

d. Lanes through rear-area mine fields. Vehicle lanes through rear-area mine fields may be located along roads and trails to prevent obvious curves or deviations which would indicate a mine field or other obstacle. Also, measures are taken to prevent forming a network of tracks converging at the entrance to the lane. Lanes must be conspicuously marked and warning signs used plentifully. The standard lane-marking method is used.

31. RECORDS AND REPORTS

Mine field records are prepared and reports are rendered for the primary purpose of informing tactical commanders of the location of obstacles which may affect tactical operations. Those records and reports serve a secondary purpose of facilitating the subsequent removal of the mines by friendly forces. The location of planned mine fields is reported prior to starting laying. During the installation of large mine fields, progress reports are submitted. Upon completion, final location and lane reports are submitted as a minimum.

a. Overlays and maps. Division, corps, and army engineers keep special situation (barrier) maps on which all essential information concerning friendly and enemy mine fields is graphically entered. This information is used to keep commanders, unit staffs, and troops in the mined areas accurately informed. Division, corps, and army engineers distribute overlays, to appropriate scales of 1:81,000,000 to 1:25,000 of special situation (barrier) maps periodically. It is important, therefore, that newly installed mine fields be recorded and records be forwarded to the proper headquarters immediately.

b. Alterations. Any changes made in a field are recorded, and the reports forwarded to interested headquarters. For example, records of changes made in a defensive mine field are sent to headquarters of division, corps, and army; records of changes made in a security mine field are forwarded to headquarters of battalion, regiment, and division.

c. Transfer of responsibility. Whenever one unit relieves another, the unit commander of the relieving unit automatically assumes all the mine field responsibilities formerly assigned to the commander of the relieved unit, unless otherwise directed by higher commander. The commander of the relieved unit furnishes the commander of the relieving unit all records and information concerning friendly and enemy mine fields in the area. He

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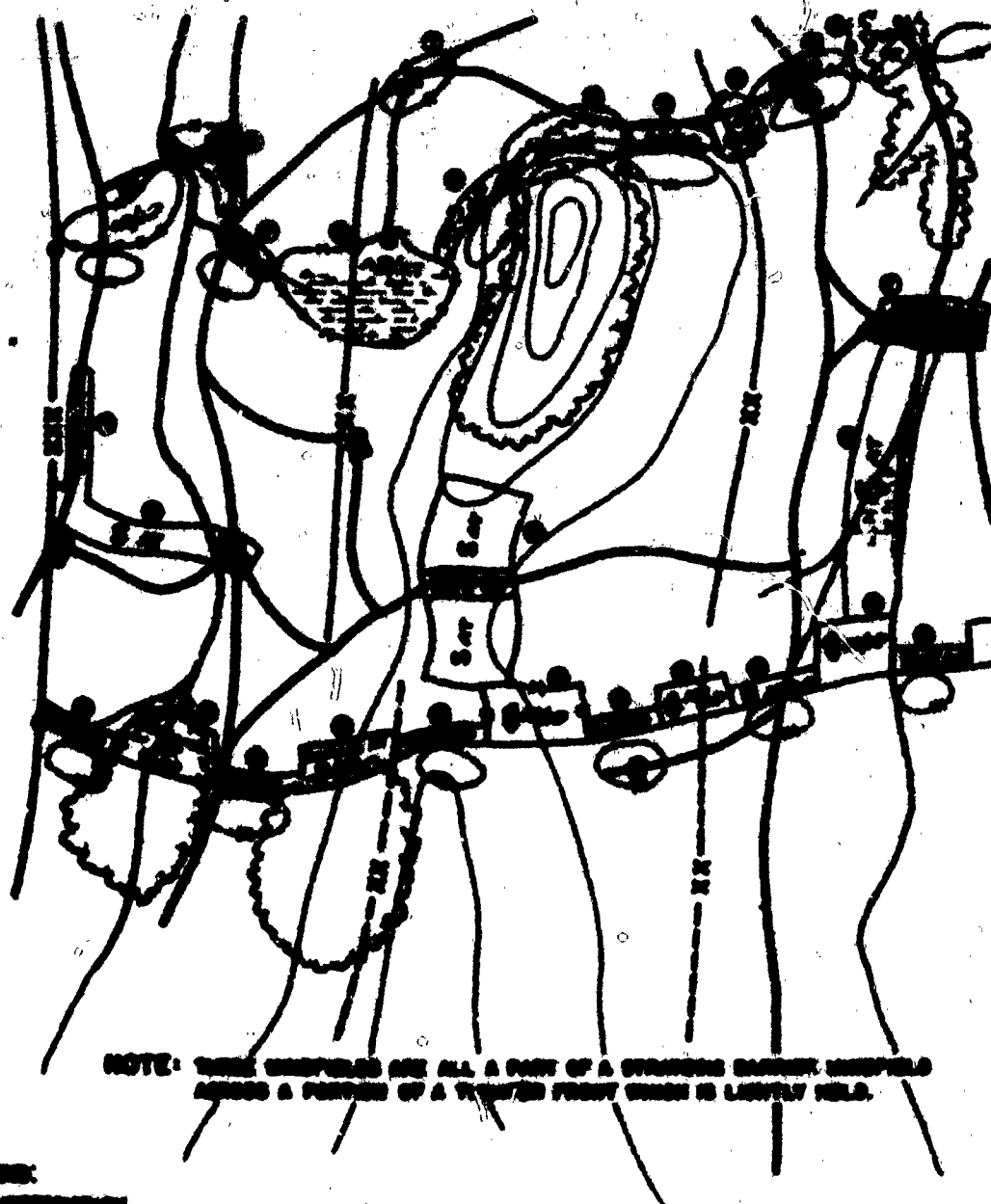
also supplies the necessary ground-reconnaissance personnel to insure correlation of all mine field information. All higher commanders are responsible for insuring that a proper transfer of information is effected.

32. MINE FIELD BREACHING AND CLEARING

a. The planning and the conduct of an attack across a large enemy mine field closely parallels that required in the attack of a river line. Breaching the initial gaps is performed by infantry troops with engineer assistance just as in an assault river crossing. As enemy fire is removed from the mine field and the bridgehead enlarged on the far side, special troops and equipment enlarge the gaps for passage of tanks and vehicles. Only those areas needed in the initial assault and support of the assault are cleared.

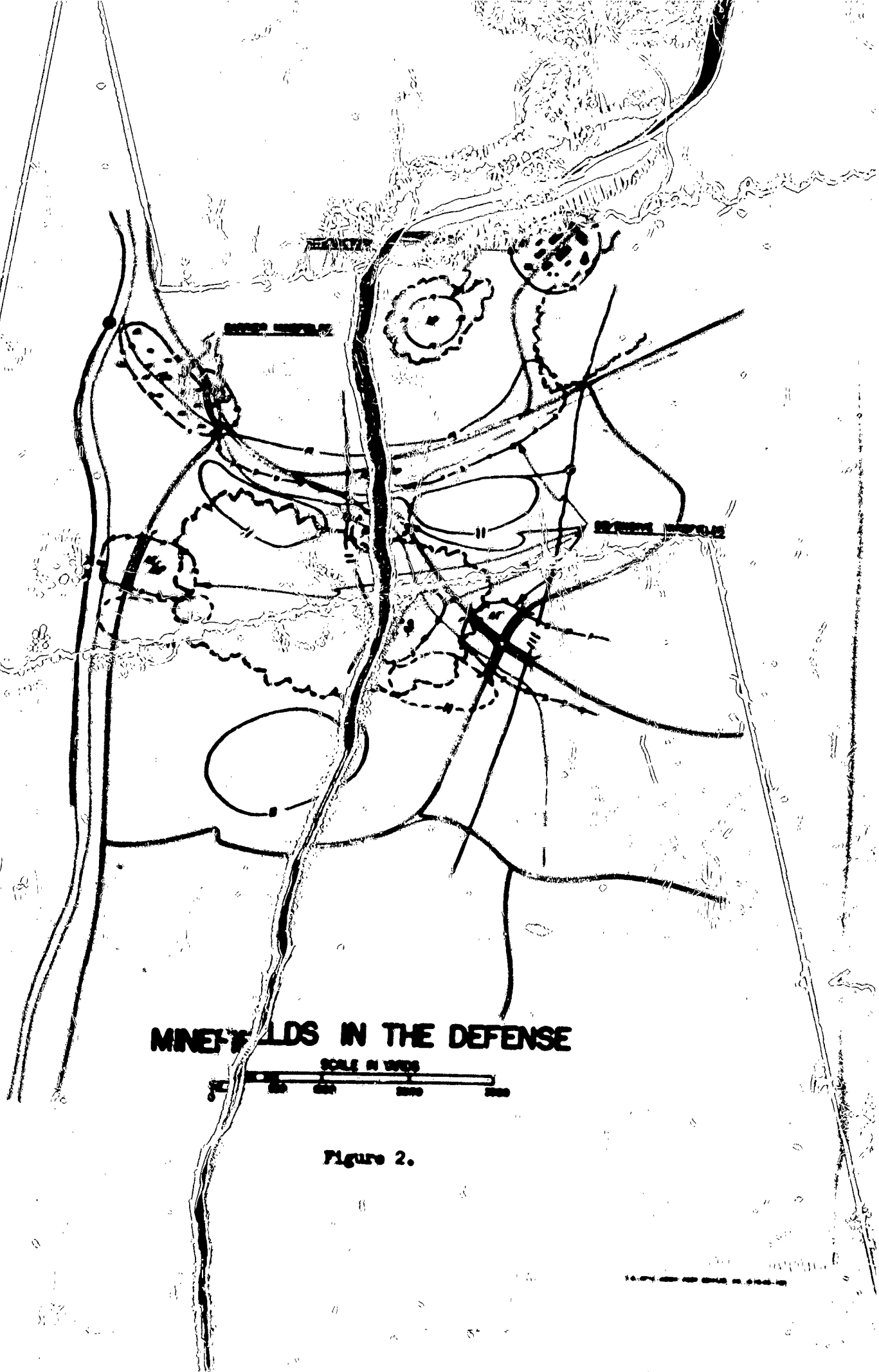
b. After the assault forces have driven beyond the mine field and have successively established a new line, the rear echelon troops clear the mines from those areas which are required for immediate use. Further mine clearance is carried out by rear echelon troops as needed. Civilian labor may be employed for mine clearance of areas for civilian use. This is usually done under military supervision.

c. Techniques of breaching and clearing mine fields are given in paragraph 60.



- LEGEND:
- ① INTERSECTION
 - BATTERY
 - SQUAD
 - PLANNED WIREFIELD
 - PLANNED FIELD, CENTERED WIRE
 - WIREFIELD IN THREE BELT FIELD

Figure 1.



MINE-FIELDS IN THE DEFENSE

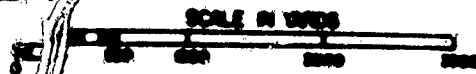


Figure 2.

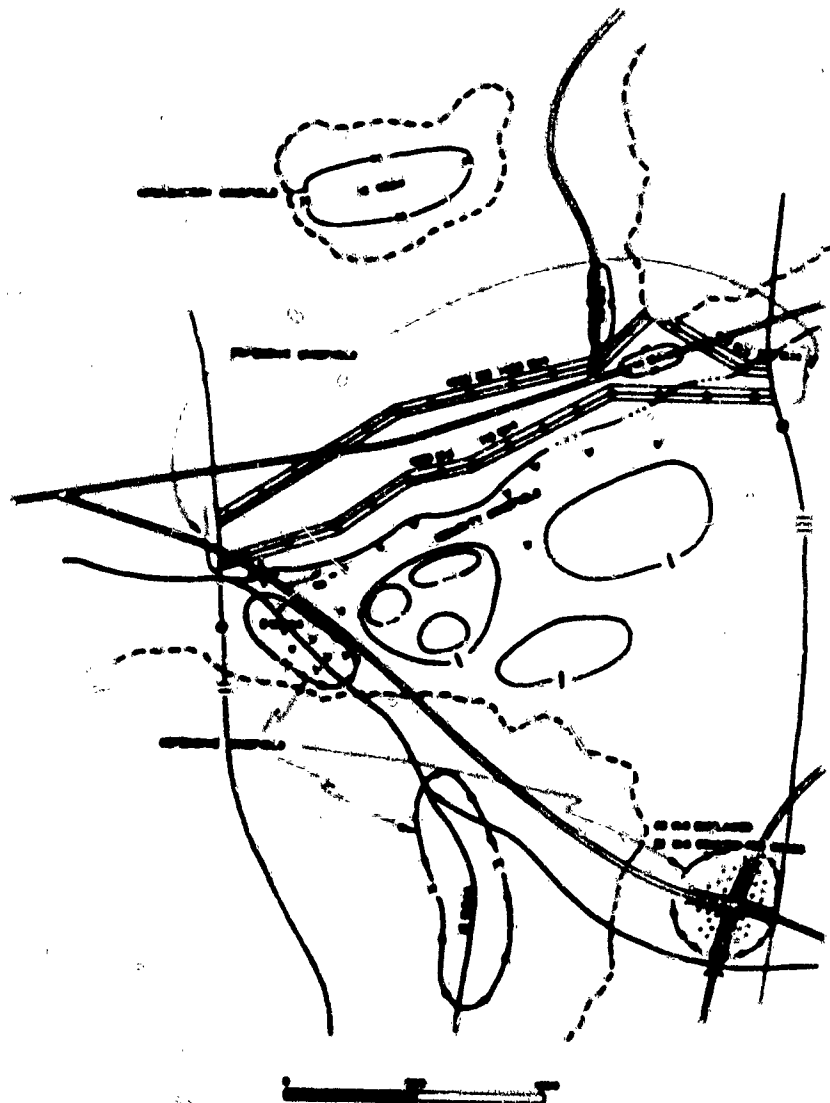


Figure 3.

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ENCLOSURE 2 TO APPENDIX A, PART ONE

GLOSSARY

Aerial Emplacement-	Aerial emplacement is the act of installing, laying, or sowing mines from aircraft.
Antilift Device- (Activate)	An antilift device is a device arranged to explode the mine to which it is attached, or to explode another mine or charge nearby, if the mine is moved.
Arming-	Arming is the preparation of a fused mine for operation.
Barrier-	A barrier is a series of related obstacles across an expected avenue of enemy approach.
Barrier Plan-	A barrier plan is a plan for a barrier system. It is designed to supplement the tactical plan.
Barrier System-	A barrier system is a series in depth of related barriers.
Booby Trap-	A booby trap is an explosive charge, either a standard mine or an improvised charge, which is exploded when an unsuspecting person disturbs an apparently harmless object.
Breaching-(Gapping)-	Breaching is the employment of any available means to secure a gap through an enemy mine field or unfamiliar friendly mine field.
Danger Area-	The danger area is that area outside the effective casualty radius within which personnel may become casualties from fragments.
Density, Area-	The area density of a mine field is the average number of mines per square yard of area.
Density, Mine Belt-	Mine belt density is the number of mines per yard of track.
Density, Mine Field-	Mine field density is the summation of effective densities in a mine field.
Detector, Mine-	A mine detector is a device capable of reliable location of specific mine types. Detectors usually have a specific application and very definite limitations.

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- Detector-Eradicator-** A detector-eradicator is a single device which combines the functions of a detector and eradicator. (See eradicator).
- Dirty-trick Device-** A dirty-trick device is a manufactured booby trap such as an explosive-filled flashlight, fountain pen, pencil, or other such article which explodes when an attempt is made to put article into normal use. Rifle cartridges filled with a high explosive, or a hand grenade with an instantaneous fuse are also examples of dirty-trick devices.
- Effective Casualty Radius-** The effective casualty radius is that distance within which 50 percent of all personnel become casualties upon detonation of a mine.
- Eradicator-** An eradicator is a device designed for rapid breaching or clearing of mine fields. Examples of this device are the snake, flail, plow, roller, and jet-clearing device.
- Floating Mine Net- (Boom)** A floating mine net or boom is a device suspended from cables or floats located upstream of river-crossing operations to stop or explode floating mines.
- Fuse-** A fuse is a device for initiating the detonating action of a mine.
- Fuse, Anti-disturbance-** An antidisturbance fuse is one which functions when moved or disturbed.
- Fuse, Blastproof-** A blastproof fuse is one which cannot be initiated by blast pressure.
- Fuse, Chemical-** A chemical fuse is one which functions when a chemical capsule is broken and the chemical comes into contact with the explosives.
- Fuse, Electrical-** An electrical fuse is one which functions when an electrical circuit is closed and fires a detonating cap.
- Fuse, Influence-** An influence fuse is one which is actuated by the properties of and the proximity to the target rather than by physical contact or pressure.

SECRET SECURITY INFORMATION

ENCLOSURE 2 TO APPENDIX A, PART ONE

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Breaching-(Capping)-	Breaching is the employment of any available means to secure a gap through an enemy mine field or unfamiliar friendly mine field.
Danger Area-	The danger area is that area outside the effective casualty radius within which personnel may become casualties from fragments.
Density, Area-	The area density of a mine field is the average number of mines per square yard of area.
Density, Mine Belt-	Mine belt density is the number of mines per yard of line.
Density, Mine Field-	Mine field density is the summation of effective densities in a mine field.
Detector, Mine-	A mine detector is a device capable of reliable location of specific mine types. Detectors usually have a specific application and very definite limitations.

SECRET SECURITY INFORMATION

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Fuse-	A fuse is a device for initiating the detonating action of a mine.
Fuse, Anti-disturbance-	An antidisturbance fuse is one which functions when moved or disturbed.
Fuse, Blastproof-	A blastproof fuse is one which cannot be initiated by blast pressure.
Fuse, Chemical-	A chemical fuse is one which functions when a chemical capsule is broken and the chemical comes into contact with the explosives.
Fuse, Electrical-	An electrical fuse is one which functions when an electrical circuit is closed and fires a detonating cap.
Fuse, Influence-	An influence fuse is one which is actuated by the properties of and the proximity to the target rather than by physical contact or pressure.

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- Fuze, Mechanical-** A mechanical fuze is one which is fired by a mechanically released striker.
- Fuzing-** Fuzing is the act of inserting a fuze assembly into a mine.
- Marker, Auxiliary-** An auxiliary marker is an improvised marker such as a buried gas can or a pile of stones used as a mine field reference point when a suitable topographical marker is too distant from the mine field for accurate reference. The auxiliary marker is usually referenced to the topographical marker and the corner of the mine field.
- Marker, Topographical-** A topographical marker is a permanent terrain feature or installation that is easily recognized on the ground and on a map that is used as a reference point in locating a mine field.
- Marking-** Marking is a means for delineating the general area of a mine field and the approaches and edges of a mine field lane or gap.
- Mine-** A mine is an encased explosive or other material designed to destroy or damage vehicles, boats, or aircraft or designed to wound, kill, or otherwise incapacitate personnel. It may be detonated by the action of its victim, by the passage of time, or by controlled means.
- Mine, Antiairborne-** An antiairborne mine is a mine designed to prevent or hinder airborne landings by damaging or destroying aircraft and its occupants and by killing or wounding parachute troops either while airborne or upon landing.
- Mine, Anti-amphibious-** An anti-amphibious mine is a mine designed to destroy or disable amphibious vehicles, landing craft, or other boats during seaborne or inland-waterways operations.
- Mine, Antipersonnel-** An antipersonnel mine is a mine designed to kill or disable personnel.
- Mine, Antirailway-** An antirailway mine is a mine designed to destroy or damage roadbeds, locomotives, or other rolling stock.

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- Mine, Antivehicular- (Antitransport)** An antivehicular mine is a mine designed to destroy or disable land vehicles other than tanks.
- Mine, Armor-piercing-** An armor-piercing mine is a mine so constructed that its blast effect, upon detonation, will be concentrated to perforate armor.
- Mine, Blast-** A blast mine is a mine which is dependent upon its blast effect to produce the desired results.
- Mine, Chemical-** A chemical mine is a mine containing a toxic gas, incendiary agent, or other chemical agents. Its purpose is to destroy or damage vehicles and kill or disable personnel through direct contact or chemical reaction produced upon contact with equipment or supplies.
- Mine, Dummy-** A dummy mine is an inert, simulated mine designed for deceptive mine fields. It may be made of any available material.
- Mine, Fragmentation-** A fragmentation mine is a mine which is constructed in such a manner that, upon detonation, it will project fragments and shrapnel.
- Mine, General-Purpose-** A general-purpose mine is a mine designed for employment against more than one type of target.
- Mine, Improvised-** An improvised mine is a mine which is made of any available materials. Improvised mines are used when standard mines are not available or are incapable of producing the desired results.
- Mine, Practice-** A practice mine is a replica of a standard mine. It has the same features and weight of the high-explosive mine. It is constructed to emit a puff of smoke or make a noise to simulate detonation.
- Mine, Probeproof-** A probeproof mine is a mine which is not easily detectable by probing.
- Mine, River-** A river mine is a mine designed to destroy floating bridges, fixed bridge piers, and ferrying equipment. They must be released upstream and floated toward enemy river-crossing operations or anchored in areas of possible enemy crossings.

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Mine, Tank-disabling-	A tank-disabling mine is a mine capable of causing sufficient damage to a tank to require second echelon maintenance.
Mine, Tank-killing-	A tank-killing mine is a mine capable of eliminating a tank from current operations by requiring base maintenance or replacement, and by causing casualties among the crew members.
Mine, Training-	A training mine is an inert replica of a standard mine used for instructional purposes.
Mine Belt-	A mine belt is an area containing mines laid to a pattern. A mine belt contains one or more mine sections and usually follows an irregular line.
Mine Clearing-	Mine clearing is the detection and removal of all mines within a mine field.
Mine Field-	A mine field is an area in which mines have been placed. It may contain mines or other explosives laid according to a pattern or without pattern.
Mine field, Anti-airborne-	An antiairborne mine field is a mine field installed primarily for protection against airborne attack.
Mine field, Anti-amphibious-	An antiamphibious mine field is a mine field installed primarily for protection against amphibious attack.
Mine field, Anti-personnel-	An antipersonnel mine field is a mine field consisting primarily of antipersonnel mines.
Mine field, Antitank-	An antitank mine field is a mine field consisting primarily of antitank mines.
Mine field, Barrier-	A barrier mine field is a mine field of considerable magnitude installed to complete the overall defense plan of large units for a prolonged period.
Mine field, Deceptive-	A deceptive mine field is a simulated mine field used in place of other type live mine fields or in conjunction with them to economize on time, labor, and materials.

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- Mine field, Defensive-** A defensive mine field is a mine field installed to improve the defensive positions of battalions, regiments, and divisions.
- Mine field, Gap-** A mine field gap is a lane through a mine field resulting from a breaching operation.
- Mine field, Interdictory-** An interdictory mine field is a mine field which hinders enemy use of an area or route. It cannot normally be protected by supporting ground fire.
- Mine field, Lane-** A mine field lane is a passage through a friendly mine field. It can be clear of mines or it may contain mines equipped with remote control devices.
- Mine Section-** A mine section is the basic element of a pattern mine field. It is that part of a mine belt which is laid without change in direction.
- Mine field, Security-** A security mine field is a mine field which provides local protection for small units.
- Mine field, Strategic-** A strategic mine field is one so located, or of such extent that its primary effect is of strategic significance. A strategic mine field is installed normally by direction of a theater or higher commander. A strategic mine field may include a number of smaller component fields, any one of which may be primarily of tactical interest.
- Mine field, Tactical-** A tactical mine field is one in which the primary application or effect is of tactical significance. A tactical mine field is installed by authority of any commander.
- Neutralization-** Neutralization is the act of rendering a mine ineffective, by destroying, removing, or disarming.
- No-Mine Area-** A no-mine area is an area outside and beyond the no-mine line designated by ground forces within which aerial mines may not be exploded without clearance from the ground forces.
- No-Mine Line-** A no-mine line is a line designated by ground forces beyond the line of contact within which aerial mines may not be exploded without clearances from the ground forces. This line is a

SECRET SECURITY INFORMATION

Mine, Tank-disabling-	A tank-disabling mine is a mine capable of causing sufficient damage to a tank to require second echelon maintenance.
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SECRET SECURITY INFORMATION

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- No-Mine Line-** A no-mine line is a line designated by ground forces beyond the line of contact within which aerial mines may not be exploded without clearance from the ground forces. This line is a

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precautionary measure to guard against accidental aerial mining of friendly ground forces. The mine line should be easily identifiable by terrain features from the air and the ground so as to prevent confusion.

- Obstacle-** An obstacle is an artificial or natural obstruction that hinders, stops, or slows down an advance.
- Pattern Laying-** Pattern laying is the placing of individual mines in a fixed relationship to each other.
- Planter-** A planter is a mechanically or hand-operated device capable of rapidly laying standard or specially developed antitank and antipersonnel mines.
- Probing-** Probing is a method of detecting mines by penetrating the earth with a sharp instrument such as a bayonet or standard mine probe.
- Resowing-** Resowing is the placing of mines by aerial or ground operations to close gaps in mine fields made by enemy penetrations.
- Scattered Laying-** Scattered laying is the placing of mines in a field without regards to pattern but to a specific density.
- Self-destruction-** Self-destruction is a means of clearing a friendly mine field by the use of delay fuzes within the mines set for detonation at a predetermined time.
- Suspect Area-** A suspect area is a locality which is believed to contain mines.
- Sweeping-** Sweeping is the use of standard mine detectors for detection of mines.
- Sympathetic Detonation-** Sympathetic detonation is the detonation of one or more mines induced by the explosion of another.
- Trace-** A trace of a mine belt is a real or imaginary line parallel to the longitudinal direction of the belt.

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APPENDIX B

RECOMMENDED CHANGES TO FM 100-5

ITEM NO	PAGE	PARA-GRAPH	LINE	COMMENT
1	134	576 a	3	Change - "Mines are laid in geometric pattern" To - "Mines <u>may be</u> laid in geometric pattern"
2	134	576 c	7	Delete - "An accurate location and give"
3	139	668	1	Delete - "zone", substituting therefore, "... in depth, consisting...."
4	139	668	2	Insert - the word "other" before the word "obstacles".

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APPENDIX C RECOMMENDED CHANGES TO FM 101-10

Recommend that present paragraph 80, FM 101-10, Staff Officers' Field Manual- Organization, Technical, and Logistical data be deleted, and the following substituted therefor:

80. MINE FIELDS

CLASSIFICATION	INSTALLATION	EMPLOYMENT	AUTHORITY	RECOMMENDATION	QUANTITIES AND RATES
Defensive	Installed for the purpose of improving the defensive plan in front or on the flanks of a battalion, regiment, or division sector or zone in order to delay, disorganize, and canalize enemy attack formations played in rear or to protect the positions of flanks from enemy counterattack. Must be covered by small-arms fire.	Employed to assist in the prevention of enemy penetration when on the defensive. When an attack has been initiated to protect against enemy counterattack. Sometimes employed in rear positions of defensive sector to add depth to the battle position and protect against likely enemy penetrations as well	Division, regiment, and battalion commanders have authority to install defensive mine fields unless such authority is reserved or revoked by the next higher commander.	The commander responsible for installing a defensive mine field or any portion thereof is responsible for the proper recording, reporting and marking of the mine field.	1000 mines per 1000 yard mine belt (1 mine per yard of belt)
				Copies of records are forwarded to the commander authorizing the installation. He, in turn, forwards copies to tactical, division, corps, and army headquarters.	Placing and burying by daylight: 1 platoon, 300 yds per hour. 1 squad, 45 yds per hour 1 man, 5 mines per hour.
					Antipersonnel mines and activated antitank mines: 1 platoon, 100 mines per hour

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CLASSIFICATION	INSTALLATION	EMPLOYMENT	AUTHORITY	RECORDING	QUANTITIES AND RATE
Defensive (Cont)		as infil- tration, guerrilla, and airborne at- tacks.			1 squad, 30 mines per hour. 1 man, 6 mines per hour.
		May also be employ- ed along beaches to repel enemy river or lake crossings and amphibious landings.			Unceasing at forward sup- ply points: 1800 mines per platoon- hour (M2, M3 and M5)
		May become part of a barrier in field during ex- tended static operations			Unceasing at mine field sites: 7000 mines per platoon hour (M4)
					Above figures are average. Quantities and rate of installation will vary depending upon type of soil and types of mines and fuses used.

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CLASSIFICATION	INSTALLATION	EMPLOYMENT	AUTHORITY	RECORDING	QUANTITIES AND RATE
Security	<p>Installed in front or around a defensive position of a small unit for protection against enemy infiltration and surprise night attacks.</p> <p>May be installed around areas of supporting units for protection from infiltrating enemy troops and guerrillas.</p> <p>It must be covered with small arms fire.</p>	<p>Employed across avenues of likely enemy approach when an attack has been halted.</p> <p>When on the defensive or in independent or isolated mission.</p> <p>Either antitank or antipersonnel mines may be used. Mines can be buried but must be placed so they are readily removable by the installing unit.</p> <p>May or may not be laid in a pattern; however, all mines must be readily locatable.</p>	<p>Any unit commander may authorize the installation unless such authority is reserved by higher commander.</p>	<p>a general location record is required. This record will include an overlay or sketch of the mine field.</p> <p>Security mine fields must be marked to prevent casualties to friendly troops.</p>	Same as defensive type field.

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CLASSIFICATION	INSTALLATION	EXPLOITER	AUTHORITY	RECORDING	QUANTITIES AND DATE
Barrier	<p><u>Tactical:</u> Installed in accordance with divisional or higher headquarters coordinated defensive plan.</p> <p><u>Tactical:</u> Employed to cover wide intervals between quarters coordinated strong points.</p> <p><u>Strategic:</u> It is placed to delay and canalize the enemy into areas covered by intense defensive fires.</p> <p><u>Strategic:</u> Installed prior to outbreak of hostilities when war is imminent or in rear areas after the outbreak of hostilities when a prolonged defense is necessary at the outset of war.</p>	<p><u>Tactical:</u> Employed to cover wide intervals between quarters coordinated strong points.</p> <p><u>Strategic:</u> Employed in such great depth and density as to have strategic significance.</p> <p><u>Tactical or Strategic:</u> Employed to protect the flanks and rear of large units in the attack and against counterattack by highly mobile enemy reserves.</p>	<p><u>Tactical:</u> Division or higher commanders.</p> <p><u>Strategic:</u> Theater or higher commander.</p>	<p><u>Tactical and Strategic:</u> Commanders of units installing portions of the mine field are responsible for reporting, recording, and marking. Copies of records are forwarded to the commander ordering the installation who is responsible for their distribution.</p>	<p>Same as for defense mine field.</p>

SECRET SECURITY INFORMATION

CLASSIFICATION	INSTALLATION	EMPLOYMENT	AUTHORITY	RECORDING	QUANTITIES AND RATE
Interdictory	<p>Installed in accordance with army or higher directives to provide a means of denying enemy use of an area or route which cannot normally be covered by supporting ground fire.</p> <p>Usually installed during or prior to the conduct of a retrograde movement.</p> <p>Can be installed behind enemy lines by aerial emplacement, patrols, guerrillas, and partisans.</p>	<p>Employed in areas and along routes which the enemy will be most likely to use.</p> <p>To prevent use of very important facilities which may fall into enemy hands or which are in his hands.</p> <p>May be employed in the conduct of a strategic evacuation and strategic bombardment.</p> <p>Use of booby traps, dirty-trick devices and delay explosive charges encouraged.</p>	<p>Army or higher commanders authorize installation.</p> <p>Authority may be delegated or revoked as considered necessary.</p>	<p>Marking is not necessarily required. If the safety of friendly troops is endangered prior to withdrawal, the installing authority may specify marking as required. Marking may be removed after withdrawal of security forces.</p> <p>A location record is required. Detailed records may be required at the discretion of the commander ordering the installation.</p> <p>Records will be distributed to army, army group, and theater commanders, when appropriate, and to subordinate commanders in whose areas the field is located</p>	<p>No set quantities but rate roughly the same as security field if laid by hand.</p>

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CLASSIFICATION	INSTALLATION	EMPLOYMENT	AUTHORITY	RECORDING	QUANTITIES
Deceptive	Installed to supplement or extend live mine fields and when time, effort, or material do not permit installation of other type mine fields.	Same as type mine field which it supplements or extends. Frequently employed to close lanes in live mine fields or to provide easily reached lanes for future operations.	All commanders have the authority for employment of deceptive mine fields.	Standard marking, recording, and reporting procedures for the mine field which is simulated by the deceptive mine fields.	Quantities of supplies varies. Rates for installing same as security mine field.
				In the event only dummy mines are used with- in the deceptive field, only a General outline of the field is required as a record.	

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- EVALUATION OF ORO MEMO T-109

1. PROBLEM. To evaluate Operations Research Office Memorandum T-109.

2. DISCUSSION

a. Keynote statement in ORO T-109.

As the new mines become available, increased probabilities of initiation with severe damage and kill, and new means of installation, could lead to tactical innovations including offensive mining and remaining inside enemy lines and in congested areas, dynamic remaining of areas of enemy penetration, and increasing minefield density to meet changing situations; - statistical random distribution of mines and use of deeper fields.

This statement appears to reflect the thought that mine tactics will follow development in mine warfare material. However, R&D in the Army appears to proceed on the opposite track; new tactical concepts express a requirement for new material which can be converted into a suitable R&D project by the derivation of desired military characteristics. In actuality, both approaches must proceed nearly agree, first one and then the other in the lead. Further, two previously unstated concepts are shown in this ORO statement. The first concept is that of dynamic remaining, remaining inside enemy lines, and increasing density to meet changing situations. This is an attempt to overcome a primary shortcoming of the mine, its lack of the mobility required to meet a threat. In normal employment, within current doctrine, the requirement for mining is established by a prognosis of enemy capabilities and courses of action. This statement indicates that new developments in mines may shorten the period which must be forecast; that mines can be placed against the enemy as his intentions are made evident by the movement of his forces. This is a sound objective for R&D, and, if realized, could serve either of two major purposes; either to reduce the logistic requirement for mines for a given degree of protection, or to considerably increase the degree of protection afforded by a given logistic commitment for mines. The ultimate extension of this concept is to apply the killing agent directly to the target. This is the solution of the gun or the aircraft. This is the utmost in economy of the killing agent, but is the most demanding on the delivery agent. The point of diminishing return lies somewhere between the extremes of the completely static mine and the completely mobile gun and is a function of the accuracy of the gun or aircraft and the relative cost of the killing agent and the delivery agent. The second previously unstated concept in the above statement from ORO T-109 is that of the use of deeper fields. This is not truly a new concept but rather is a normal outgrowth of mines of increased effectiveness. Mines at the close of WW II were generally contact type with pressure plate areas on the order of .05 to .1 square yards. New developments in influence fuzing and in mines employing special effects indicate that mines with an area of influence on the order of 10 to 15 square yards will be available in the very near future. This alone indicates that, for a given commitment of mines at a given linear density, greatly increased probabilities of hits are possible and that the depth of field may, or must, be greatly increased in order to most effectively utilize the greater area of susceptibility. Increased depth is greatly to be desired, since breaching effort can be increased in direct proportion to the depth of the mined area. Protection afforded by a

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minefield increases in proportion to the breaching effort required. In a conventional six-row field with the M6 mine, .2 percent of the field area and 12 percent of the linear front is susceptible. In an influence field of the same density, 600% of the linear front is susceptible; to achieve the same percentage of susceptible area the field may be 4000 yards deep. This depth is not practicable since the influence area of the fuse is approximately circular and since the uniform linear density or uniform impenetrability can only be achieved to a depth of approximately 60 yards. Substantial increase in minefield depth and some similarly derived depth, without increase in linear density, must be carefully evaluated if serious defects are to be avoided. It is true that breaching effort increases proportionately to the depth of the field, and that the effectiveness of the field in stopping tanks in any one linear pass is as great in a deep field as in a shallow field. However, as the depth of field is increased, the opportunity for following-tanks to pass around the immobilized leading tank and to continue through the field is increased (fig 1). This is due to the fact that following-tanks pass through some part of the field safely and in trace. Each successive casualty adds an increment to the safe-passage until complete passage is achieved. As acknowledged in ORO T-109, the counter measure to this breaching technique is the use of relatively shallow areas of higher density with the deep field. This is actually an increase in density and effect such as is achieved by the currently recommended practice of laying a basic pattern and then thickening it subsequently by the addition of scattered mines about the basic pattern.

(Figure 1. Breaching of type mine fields.)

b. Maximizing minefield effectiveness. ORO T-109 suggests certain concepts to contribute to the maximum effectiveness from mines in defensive situations.

- (1) Consider mines as a dynamic part of the defense rather than as static only.

The employment of mines is dynamic to the degree that it is able to respond promptly to meet an enemy threat. The dynamicism of mines is related to the variety of means by which, and the speed with which they may be used to counteract threats. Within the current mines there exists the capability of dynamic employment in the broad sense; they may be hastily laid, or shifted, to counteract enemy capabilities as they are recognized. Further development of mines and related materiel to permit machine laying, placement by rocket, artillery, mortar, aircraft, or other means will make the employment of mines more dynamic in nature and more responsive to the requirements of the situation.

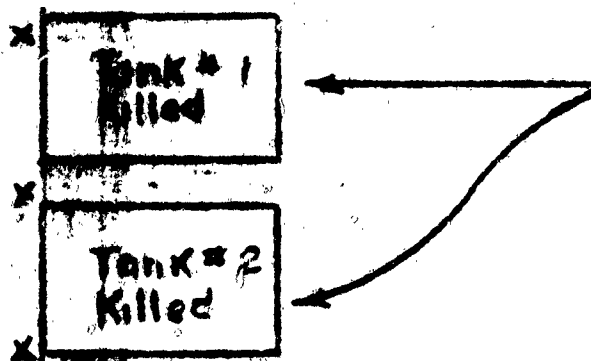
- (2) Use mines strategically, tactically, in salient or strongpoint defense, in the development of air heads, in retrograde movements, in guerrilla warfare, and in attacking enemy lines by air, artillery, and rocket. This concept requires an appreciation by military commanders of the range of capabilities and limitations of mines as a general class of weapons. The basic problem of integrating mine warfare into the tactics applied to any

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Case A: Mines placed in a single row, 10' center to center. Mine is influence type actuated by full width of 10' target vehicle plus 5' either side.

Initial tank in column is stopped. Any tank passing around is likewise stopped, etc.



Case B: Mines and vehicle as in Case A. Mines placed in depth.

Initial tank in column is stopped. Any tank passing around is partially through the field and consequently has greater probability of safe passage.

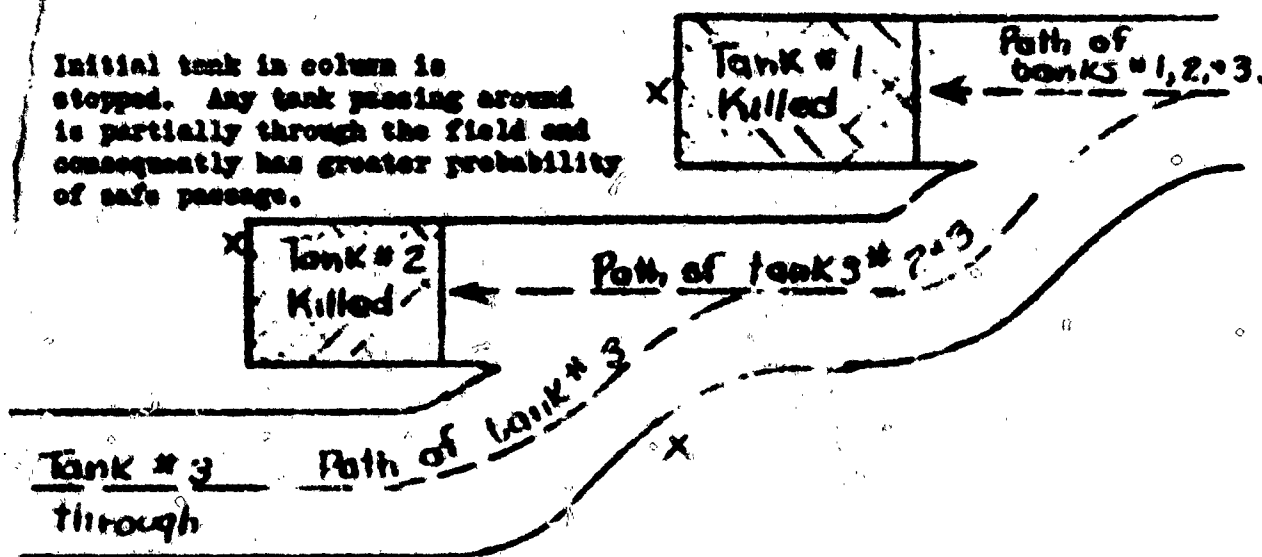


Figure 1. Breaching of type mine fields.

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given situation is a problem of producing in the commander an appreciation of the mine. Attempting to anticipate the proper application of mines to all situations will not prove successful. Rather, the effort had best be directed toward a general appreciation of mine employment and to application to general situations. A doctrine is required that would be sufficiently broad to be applicable to the majority of situations yet sufficiently pointed to provide rather close guidance in the most normal situations. Within the field of R&D as requirements pertinent only to a special situation are foreseen, development to meet the special requirement should be undertaken.

- (3) In the planning of minefields, a first consideration should be the provision of passages for counterattack. This is an appreciation of the fact that mine fields once installed constitute a limitation on the defender as well as on the attacker against whom it is designed. If the defender is not to deprive himself of his later capability for offensive action, he must plan, from the very first, the course of his contemplated action and make provision for it on the formation of his barrier plan.
- (4) A minefield has a continuous existence in two phases. The first of these is the period of initial laying, the second the period of refining the field or increasing its effectiveness in the face of actual or probable enemy threat to increase canalization. This is in essence a restatement of the concept in paragraph 2 above. It is an aspect of the dynamics of mine warfare. Until refining can be realized in mine field areas, the ultimate effect of interdictory fields cannot be realized. In defensive or barrier fields, the ability to refine passages or gaps behind the enemy materially increases the possibility of destroying him by counterattack. The ability to deepen and strengthen a field while the enemy is attempting to breach it will result in greater canalization of his movement. It will also offer more remunerative targets to other weapons in the narrow area of canalization.
- (5) A minefield should be laid on the closure principle - as against the attrition principle. This statement indicates that the minimum density of mine field to be employed should give a probability of mine initiation for any pass approaching 100 percent. Any lesser density permits the mine field to be breached by "bulling-through" tactics of several tanks abreast, with the probability that one or more will successfully negotiate the field and that others will be able to safely pass through the field in trace. The attrition principle in minefields will canalize an enemy and rob him of the use of mined areas. It will not impose on him appreciable delay in a straightforward effort to "bull through". Closure within a mine field can most successfully be provided by relatively shallow high-density belts within a deep field. However the overall depth of the mine field must be of a maximum to offer the greatest delay to breaching or clearance operations.

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- (6) Minefields should be laid in depths of 1-10 miles - on the closure principle if possible - to make clearance impractical. The feature of depth in a minefield is a counter to enemy effort to breach or clear gaps in the mine field. The total breaching effort required increases in direct proportion to the depth of the mine field. The feature of depth also increases the degree of canalization afforded and increases the effectiveness of other weapons capable of striking the enemy as he passes through the field. Depth versus the local density to provide closure, and depth against the overall mine field density to provide delay must be weighed carefully against logistic capabilities and the trafficability of the various areas of the field in order that a field of balanced effect can be laid.
- (7) Mines should be laid statistically at random. Provision should be made for complete clearance by pre-set sterilization. Complete statistically random laying of mines is desirable insofar as it can be practically realized and insofar as it can be reconciled to the probable need for future friendly removal of the field. Statistically random laying requires recovery of individual mines either by fairly precise survey or by individual detection methods. This is an advantage in that it is less readily susceptible to enemy breaching effort but a disadvantage in that it may limit future friendly passage of the area. Experience has indicated the futility of attempting to record individual mine locations in large-scale employment. Assuming that true statistically random laying is possible, it may often be employed in areas within barrier mine fields and may be occasionally employed within defensive fields, but will seldom be desirable for employment within a security field. It will be the general rule within interdictory fields. Caution must be exercised where statistically random laying is authorized throughout a mine field in order to prevent departure from a true random basis and in order to avoid major local deviations in field density. The need for a sterilization feature in mines exists in almost every type of mine installation. When this feature is realized, one objection to random laying will have been removed and its use can be more widespread.
- (8) Maximum use should be made of tactical ingenuity, flexibility, and terrain in the design of minefields. This requires an appreciation of mine and mine field capabilities and limitations. Mine doctrine in itself will not produce tactical ingenuity, flexibility, or maximum utilization of terrain in design. The requirement created by this concept is broad training, particularly in higher commanders and staff officers.
- (9) Protection of the mine field is of primary importance. This is an acknowledgment of the accepted truth that any mine field can be breached if the enemy will accept the casualty and/or time sacrifice required. The mine field alone is of little value. It must be coordinated with and integrated into the overall plan to further the mutual effect. Protection must be provided consistent with the difficulty of negotiation of the

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fields. Shallow, low-density, simple mine fields will require weapons in place within or near the field if appreciable value is to be received; dense, deep, complex fields may be initially provided with observation or occasional surveillance only, but for realization of their effectiveness mobile reserves of appropriate weapons must be provided.

(10) Temporary security mine installations, traps, and road blocks are not precluded. Mines and traps are provided for within current doctrine and are generally accepted and practiced.

(11) AP mines should be an integral part of the mine field system and should be used to protect antitank or antivehicle fields, to cause casualties, to provide warning, and to provide a psychological effect on the enemy. Current published doctrine acknowledges these functions of the antipersonnel mine, but in some cases imposes somewhat severe restrictions on their use. Current practice extends further toward a full utilization of these capabilities of the AP mine and should be reflected by some relaxation of the restrictions now imposed.

3. CONCLUSIONS.

a. That examination of CRO T-109 discloses little that can be classified as wholly new within the field of mine warfare doctrine. In the main, the concepts advocated in this document are extensions of existing doctrine. Two general lines of extension are followed. One acknowledges progress in the research field and establishes definite, immediate objectives for development. These objectives appear realistic and desirable and are generally as follows:

- (1) Development of a wide variety of influence initiations.
- (2) Increase in the kill and damage probabilities of mines.
- (3) Provision for flexibility in means of installation.
- (4) Minimizing of detection and destruction of mines by development of:
 - (a) Camouflage
 - (b) Variety in mine effects and fuzing
 - (c) Increases in depth of burying capability
 - (d) Non-metallic mines and fuses
 - (e) Increased durability and life of mines
 - (f) New and improved methods of trapping mines
- (5) Provision of the maximum possibilities for friendly disarming.

b. That the second direction of extension of doctrine is a reflection of an existing training deficiency within the Army. Published mine doctrine, and in consequence mine training, has tended to be dogmatic. Training

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should avoid dogma and should extend throughout the Army to higher commanders and staff officers and should deal in capabilities and limitations of mines and in inducing an appreciation of the mine's relationship to other weapons.

4. RECOMMENDATION.

It is recommended that CMO T-109 be studied carefully in connection with the extension of mine warfare training and in connection with the review of the Research and Development program.

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APPENDIX F AUTHORITY OF COMMANDERS

1. **PROBLEM:** To propose a basis upon which authority and responsibility for employment of mine warfare may be established throughout the various echelons of command.

2. **ALTERNATIVES.**

a. That mine warfare material can be programmed for production in sufficient quantities for the present or proposed mine warfare program.

b. That continued research and development will provide increasingly effective mine warfare material as required for combat situations.

3. **FACTS**

a. Mine warfare has proved itself an effective means to assist the commander in implementing his tactical plan.

b. Commanders at all levels are frequently faced with situations in which mine warfare can be employed to support the commander's plan.

c. Present doctrine does not provide latitude for all commanders to employ mine warfare according to dictates of the local situation.

4. **DISCUSSION**

a. Existing mine warfare policies as prescribed in FM 5-32 and FM 101-10, and as summarized in inclosure #1, specifically delineate the command authority required, the limit of tactical employment authorized, the conditions of recording and reporting, and the other control measures affecting the employment of mine warfare by tactical commanders.

b. Engineer technical personnel and engineer units are available and organic to combat divisions and higher echelons. Thus, provisions are made at these headquarters for advisory specialists in mine warfare, and for working personnel who may be assigned missions of mine laying and mine removal without referring to or calling for support from higher headquarters. The division is the lowest tactical unit having organic engineer troops and the division commander may make available the necessary portion of his organic engineers to regiments or separate battalions as the tactical situation dictates. Training for organic personnel must be adequate to permit performance of tasks assigned to small units.

c. In providing for defense, the theater commander prepares the theater strategic plan. As a part of this plan, mine warfare contributes as a primary weapon or as a support weapon. Complete area coverage is established and unit responsibilities are determined from which implementation is effected. The implementation must be the responsibility of the lowest coordinating agency, which may be the battalion, with the assistance of necessary attached or supporting troops. This provides the division commander with the knowledge of the strategic plan as it affects his area and around which he can plan his local mine warfare program. The division commander is qualified to determine his local requirements for mine warfare

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and can best plan the use of mines for any defensive role he may assume or to assist any offensive action he may pursue. No operational limitations or restrictions should be imposed upon the division commander except those required to coordinate mine warfare activities with adjacent units or with units passing through; and even such restrictions should be minimized in recognition of the necessity of coordination by the commander to insure the effectiveness of his own plan and safety of friendly units.

4. As a formula, we might state that a commander should place no restraint or control on the next lower commander as regards mine warfare activities where this commander has trained personnel available. Rather, the appropriate Field Manuals must establish and treat standard methods and practices; training must be thorough and actually render the individuals organically provided for mine warfare activities; and only such restrictions should be issued by a higher headquarters as may be necessary to coordinate the planning and safety of the command as a whole. A commander should be given the same freedom and latitude in conducting his own mine warfare activities as he is with his other assigned means. Since the division commander determines the attachment or support status of his divisional engineer personnel as well as the specialist mine personnel of the units, he is able to provide the required technical advisors to the regiments and battalions and thus permit those commanders more freedom of action in regard to their employment of mines.

5. CONCLUSIONS

a. That division commanders have technical personnel available to them as advisors in mine warfare activities and that such personnel may be attached to or placed in support of regiments, battalions, or even companies if it is desired to carry the assumption this far.

b. That mines can be employed by a commander as a part of his weapons system either defensively or in support of offensive action.

c. That commanders should direct mine warfare activities of subordinate units only to the extent necessary to coordinate the planning or safety of the command as a whole.

d. That no restrictions should be placed on a commander as regards mine warfare activity except as may be necessary to coordinate the tactical or strategic plan.

6. RECOMMENDATIONS

a. That commanders' authority in employment of mine warfare not be restricted except as necessary in coordinating the tactical or strategic plan.

b. That technical training of organically assigned personnel within all units be thorough and at an appropriate level.

c. That applicable Field Manuals and Technical Manuals be revised to include such methods and practices of mine warfare as will standardize such activities for the using agencies toward the end that restrictive measures are not required by higher echelons of command.

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4. That commanders and staff at all levels be oriented, indoctrinated, and trained to the maximum extent possible in mine warfare activities to include capabilities and limitations.

3
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SUMMARY OF US ARMY WARFARE POLICES:

一	二	三	四	五	六	七	八
九	十	十一	十二	十三	十四	十五	十六
十七	十八	十九	二十	二十一	二十二	二十三	二十四
二十五	二十六	二十七	二十八	二十九	三十	三十一	三十二
三十三	三十四	三十五	三十六	三十七	三十八	三十九	四十
四十一	四十二	四十三	四十四	四十五	四十六	四十七	四十八
四十九	五十	五十一	五十二	五十三	五十四	五十五	五十六
五十七	五十八	五十九	六十	六十一	六十二	六十三	六十四
六十五	六十六	六十七	六十八	六十九	七十	七十一	七十二
七十三	七十四	七十五	七十六	七十七	七十八	七十九	八十
八十一	八十二	八十三	八十四	八十五	八十六	八十七	八十八
八十九	九十	九十一	九十二	九十三	九十四	九十五	九十六
九十七	九十八	九十九	一百	一百零一	一百零二	一百零三	一百零四
一百零五	一百零六	一百零七	一百零八	一百零九	一百一十	一百一十一	一百一十二
一百一十三	一百一十四	一百一十五	一百一十六	一百一十七	一百一十八	一百一十九	一百二十
一百二十一	一百二十二	一百二十三	一百二十四	一百二十五	一百二十六	一百二十七	一百二十八
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一百三十七	一百三十八	一百三十九	一百四十	一百四十一	一百四十二	一百四十三	一百四十四
一百四十五	一百四十六	一百四十七	一百四十八	一百四十九	一百五十	一百五十一	一百五十二
一百五十三	一百五十四	一百五十五	一百五十六	一百五十七	一百五十八	一百五十九	一百六十
一百六十一	一百六十二	一百六十三	一百六十四	一百六十五	一百六十六	一百六十七	一百六十八
一百六十九	一百七十	一百七十一	一百七十二	一百七十三	一百七十四	一百七十五	一百七十六
一百七十七	一百七十八	一百七十九	一百八十	一百八十一	一百八十二	一百八十三	一百八十四
一百八十五	一百八十六	一百八十七	一百八十八	一百八十九	一百九十	一百九十一	一百九十二
一百九十三	一百九十四	一百九十五	一百九十六	一百九十七	一百九十八	一百九十九	二百

* Analysis from FFA 3-31, May 1949; FFA 101-16 (Draft), 1 June 1948.

(C) All nine Golds, regardless of type of previous United employment, business, extensive travel, etc., demanded and had preferred.

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Approved
Special Agent in Charge of Puerto Rico (S)

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APPENDIX C

MARKING, RECORDING, AND REPORTING

1. **PROBLEM:** To determine the extent and degree of marking and recording the emplacement of mines, other explosive devices, and of mine fields, and to establish a policy as to reporting of mine information by the responsible unit.

2. ASSUMPTIONS:

a. Mines and explosive devices will play an increasingly important role in our present weapons system.

b. That certain requirements exist for the marking, recording, and reporting of mines, other explosive devices, and mine fields.

c. Commanders at all echelons will be authorized greater latitude in the conduct of mine warfare activities in future operations.

d. Friendly forces must be acutely aware of and active against enemy mining capabilities and activities and recognize the importance of marking, recording, removing, and reporting enemy mines and explosive devices whenever encountered.

3. FACTS.

a. That friendly troops, unaware of the existence of friendly mines and explosive devices in an area in which they are operating, are subject to casualties of a comparable rate expected from enemy troops under similar circumstances.

b. Marking and recording of mines and explosive devices must be accomplished at the time of emplacement to insure the highest degree of accuracy.

c. Mine field records and reports are invalidated as a result of enemy occupation of the mine field area.

4. DISCUSSION.

a. Marking of Mines and Mine Fields.

(1) Marking of mines or mine fields is the process of placing signs, markers, barriers, or other material to indicate the location of specific mines or the general outline of the area containing the mine field. By marking most mine fields, the full purpose of the respective mine field is obtained, serving to warn the enemy that he cannot pass through the area, or must clear the area to permit passage of his troops. Mine fields are of five types including the deceptive mine

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fields containing usually the nonactive, or dummy mines. To be effective as a deceptive field, some marking must be made which leads the enemy to believe that an active field is exploded therein, otherwise no deception is gained. Occasionally, surprise may be gained and a greater percentage of casualties inflicted by removing markers from the enemy side of the mine field and such tactics should be used when such an advantage can be reasonably predicted. Marking is of additional importance to insure safety to friendly troops by preventing their movement into danger areas. Marking, then, is intended to serve two primary purposes: to warn the enemy that he is denied the use of a marked area or must be willing to accept casualties if he decides to pass through it; and to warn friendly troops of the existence of the danger area.

(2) The degree and extent of the marking may vary with the extent, location, and purpose of the mine field. Security mine fields are emplaced for the purpose of surprising the enemy and warning friendly troops of enemy presence. Marking of them may be considered necessary on the friendly side to protect our own troops but not necessary on the enemy side to permit the full effect desired. Defensive and barrier mine fields should provide full protection to friendly troops and consideration must be given to marking the near side of the mine field. Marking of the enemy side of the field will have the desired effect of blocking enemy use of the area and will create the delay while the enemy is required to effect a decision as to action, the time involved in their preparing plans to bypass or to breach, and the further time required to execute their plan. Effect gained by blocking action of the mine fields would be accomplished through marking. Only where surprise and excessive casualties can be assured, should consideration be given to eliminating the markings on the enemy side of the field. Marking will outline the general area mined but should not divulge the pattern, type, or quantity of mines used. If this policy is followed in the marking of defensive and barrier mine fields, then the same policy applied to deceptive mine fields provides an equally effective means of blocking and delaying the enemy with an economy of forces and material. Deceptive mine fields must be marked on the friendly side just as defensive and barrier fields, to prevent use by friendly troops resulting in paths and vehicle tracks which may be picked up by enemy aerial photographs. Interdictory mine fields may be marked if blocking (or denial) of enemy is the desired effect. If the effect desired is to produce casualties for a limited time, or over a prolonged period through increased mine density or delayed activation, then the field might not be marked and so provide the greatest surprise effect.

B. RECORDING OF MINE FIELDS

Recording of mine fields means the listing of a mine field location, its limits or extent, the types of mines used, its pattern, its reference markers and their coordinates, the distance to the field and the azimuth, the fencing lanes, and in fact all information required to provide a complete record of the installation. This will permit planning of tactical operations, capping for passage of friendly troops,

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and transfer of responsibility. Such recording also assists higher headquarters to maintain accurate situation (barrier) maps upon which all essential information concerning friendly and enemy mine fields may be graphically entered. For all of these purposes, records and report forms must be provided. The information must be recorded at the time a mine field is exploded to insure the greatest accuracy. The reports and records must be characterized by simplicity and completeness of detail, but completeness should not be sacrificed for simplicity. Information contained in the records should leave nothing about which the higher commander must guess concerning the details of the mine field. Essential information only must be entered but not so extensive as to unduly burden the unit responsible for recording. Copies of records prepared must be retained by the responsible unit. The next higher unit should consolidate, into a single record, all information from subordinate units for submission to the next higher headquarters. In order to maintain all records on a current status, supplemental reports may become necessary as changes are made in the size, type, density, mine location, or when lanes are changed. Occasionally, photographs may be used for details of either an original or supplemental report.

2. REPORTING OF MINE FIELDS.

Reporting is the act of providing higher headquarters with a statement that a mine field is to be exploded, the estimated time required, the interim status of progress, and a final statement of completion. These reports provide higher commanders with information of intended action and progressive information pending completion of records. Reporting assists the higher commander in overall planning and coordination of available effort, and without such reports no information would be available to the commander until records had been completed and forwarded. Both the authorizing commander and the commander responsible for exploding the mine field must accomplish the necessary reporting.

3. CONCLUSIONS.

a. That marking, recording, and reporting of mine fields, both friendly and enemy, are necessary for insuring complete records, coordination of mine warfare activities, and necessary control or counter measures at successive command levels.

b. That current procedures for marking, recording, and reporting of mine fields, both friendly and enemy, are comprehensive and require modification only in the interest of simplicity of preparation and timely reporting (see Incl. 1).

c. That units responsible for installation of mine fields must mark, record, and report exploded fields, and through supplemental reports provide higher headquarters with records which will reflect the true current status of the exploded fields.

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d. That all units must be responsible for reporting, recording, and marking enemy mine fields upon discovery.

6. RECOMMENDATIONS.

a. That FM 5-32 be revised in accordance with the following objectives:

(1) To outline procedures of emplacement of mines and mine fields in such simplified form as to minimize the necessity for supervision by engineer personnel.

(2) Simplification of appropriate forms and records to permit preparation and submission of accurate reports on mine warfare activities by the responsible units utilizing nontechnical personnel.

(3) To minimize restrictions as to commanders' authority in employment of mine warfare and to stress the commanders' responsibility for marking, recording, and reporting mine warfare activities in the proposed forms and procedures.

(4) To insure that full intelligence of enemy mine warfare will be processed through channels to theater headquarters to include the action taken by friendly units to locate, mark, record, and clear the mines or mine fields encountered.

b. That necessary forms developed for the purpose of recording and reporting mine activities be made readily available by placing such forms within the packages or containers received by the mine crew at the mine field location.

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INCLOSURE 1

To Appendix G

Marking, Recording, and Reporting BY TYPES OF MINE FIELDS

1. SECURITY MINE FIELDS.

a. Marking of security mine fields to include safe lanes is essential to insure the safety of friendly troops as a minimum requirement. The unit exploding this field should mark the near side of the field with whatever marking material is available so as to ensure its recognition by friendly troops.

b. Recording of security mine field by the unit is essential, and such records will be turned over to higher headquarters or to a replacement unit in case of nonremoval.

c. Reporting of the placements of security mine fields will be made, verbally or in writing, at time the action is initiated. Further reporting is required only if exploding unit displace forward and is unable to remove the mine fields.

2. DEFENSIVE MINE FIELDS. Defensive mine fields are semipermanent or permanent in nature and must be marked, recorded, and reported so as to safeguard friendly elements.

a. The defensive minefield must be marked in the manner prescribed in paragraph 21 of FM 5-32, May 1949, to prevent casualties to our own troops. Such marking should include safe lanes.

b. Records must be prepared as prescribed in paragraph 33 FM 5-32, May 1949, and submitted by the authorizing headquarters to the next higher headquarters.

c. A report will be submitted by the responsible unit at the time installation of the defensive mine field is begun, and upon completion of marking and recording. Reports will be forwarded to the next higher headquarters for consolidation with the reports of other units and further forwarded as necessary to insure that all headquarters up to and including at least that of division have records and reports of the defensive mine field. Reports will be prepared in accordance with FM 5-32, May 1949.

3. BARRIER MINE FIELDS. Barrier mine fields are considered of a permanent nature and all precautions must be taken to protect friendly troops without divulging the extent or character of the mine field.

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g. Marking will be accomplished as prescribed in paragraph 21 of FM 5-32, with one exception; as friendly troops are withdrawn from contact with the barrier mine field, all marking, with exception of the barbed wire on the friendly side may be removed, and such barbed wire must not reveal the actual extent or arrangement of the field.

h. Recording will be accomplished as prescribed in paragraph 23, FM 5-32, but it must be borne in mind that such records are invalidated after enemy occupation of the mine area or its environs.

i. Reporting will be accomplished upon starting emplacement, upon completion of belts and/or sections, and upon completion of the entire field for which the reporting unit is responsible. Records and reports will be forwarded to the next higher headquarters by the commander authorizing the emplacement, and further forwarded as necessary to insure that headquarters up to and including at least that of division will receive the reports.

4. INTERDICTION MINE FIELDS.

a. Interdiction mine fields may or may not be marked according to the nature of the mine field and desired effects. Fields prepared as interdiction fields should be marked as long as such fields are under friendly control, and such markings may be removed if so required for any purpose. Once such fields have come under enemy influence, friendly markings are no longer valid.

b. Interdiction mine fields laid behind friendly front lines must be recorded in order to protect our own troops. If such fields are laid behind enemy lines, recording will be as complete as conditions will permit in consideration of the safety to the laying party. Records, if not complete in detail, must indicate type, extent, and approximate coordinates of the field.

c. Reporting of interdiction mine fields will be made by the responsible commander prior to their installation and upon their completion. These reports will include statements as to conditions under which field was emplaced, i.e., behind enemy lines, under observation, under fire, concealment provided, and effect desired. Reports and records of such fields will be maintained by headquarters at least up to and including that of division.

5. DECEPTIVE MINE FIELDS. Deceptive mine fields may be emplaced with live mines, dummy mines, or both, and must not visually differ from other mine fields.

a. Deceptive mine fields are set up for the purpose of deceiving or confusing the enemy and for this reason must be marked in the same manner as other fields, in accordance with paragraph 21, FM 5-32, in order that full effect of deception is gained.

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b. If live mines are used in deceptive mine fields, recording will be accomplished as prescribed in paragraph 33, FM 5-32, to show the exact boundary of the field and the specific location.

c. Reports of fields containing only dummy mines will be made to next higher headquarters by the unit placing the field. Deceptive fields containing live mines will be reported as prescribed for the defensive mine field.

6. ENEMY MINE FIELDS.

a. Enemy mine fields upon being breached or overrun will be immediately marked by the unit in contact; breaching and safe lanes will be defined; and, if necessary for the safety of following units, guards will be placed at critical or unsafe locations.

b. Initial recording of enemy mine fields by combat elements must be as complete as time permits to insure the safety of friendly troops. As soon as combat elements have passed through and secured the general area including the mine field, technically trained personnel must be utilized either to clear the entire enemy mine field or to permanently block off and identify such portions as cannot be cleared. Records of enemy mine fields will be forwarded through channels to theater headquarters. Supplemental reports must be accomplished by successive echelons of command to indicate the action taken at various command levels to clear or block off portions of the field. Records to be maintained on enemy fields will cover the same information required for our own mine fields and include all details available.

c. Reporting of enemy mine fields must be made by all units coming upon an unknown mined area, whether it be marked or unmarked. Report must be submitted by the most rapid means available through channels to insure that all headquarters up to and including Theater have this information without delay. Supplemental reports will indicate action taken to clear, reduce, destroy, mark and block such enemy mine fields.

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g. Definitions of mine field types contained in present doctrine do not appear to provide for the following functions:

- (1) Creation of major barriers capable of slowing the penetrations of large enemy forces. These barriers may be of such size as to be of strategic significance.
- (2) The installation of mine fields in rear of the enemy's front lines which are designed to deny his use of certain areas or facilities. These installations may be of tactical or strategic significance.
- (3) Means of denying our river banks to enemy crossing forces and of destroying enemy bridges built during crossing operations.

4. In directing the installation of specific mine fields, a commander must clearly define in detail the functions which he wants each mine field to perform. This problem can be simplified by an all-inclusive functional mine field classification system in which the name given to each type of mine field would describe the function of that mine field. Further, this system could be used to define each field in terms of the types of mines, the pattern, the marking, the records, etc. which are required to fulfill its intended purpose. However, the terminology used must not be so inflexible as to indicate undue restrictions on tactical application. Any change or extension of doctrine in the use of mines or in the types of mine fields will require some revision of existing terminology.

3. CONCLUSION. Present mine warfare terminology is complicated and confusing and therefore should be simplified.

4. RECOMMENDATION. That current land mine warfare terminology as expressed in FM 5-32 and other appropriate Army publications be revised with a view towards clarification and simplification.

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g. It appears then, that laying of mines in a pattern offers its greatest advantages to fields in close proximity to friendly positions, to fields best covered by fire, and to fields most apt to require gapping for passage of friendly troops. In those fields partially or completely out of control of the defender, the disadvantages of a pattern outweigh the advantages. In the intermediate fields, a pattern of a general nature, capable of controlled density within a very local area, is required.

h. The question of whether or not to use a pattern depends on three conditions: In those fields close to the defender, a formal pattern with a minimum provision for alteration or modification is required. In those mined areas which are designed to pass out of control of friendly forces, no pattern is required or desirable. In the intermediate types of fields, the controlling conditions are not clear cut and the need is for a basic mine element or mine section which is small and capable of a very high degree of flexibility and adaptability. The need then is not only for sufficient control to provide a known basis for increase in depth or density but also for a general control sufficient to permit conformance to the terrain and to provide for maximum security of location of the individual mine.

5. CONCLUSIONS. Three general methods of laying mines with regard to pattern are required. These methods are:

a. Regular laying. This is, essentially, the method of laying mines from a base line or lines with fixed offsets at fixed intervals by a prescribed drill. It is best adapted to use in security and defensive mine fields which are effectively covered with fire, or in portions of barrier fields where a need for future passage of friendly troops or removal of that portion of the field is anticipated. This method may contain basic elements in common with the irregular-laying classification below in order that maximum training value can be realized.

b. Irregular laying. This is, essentially, a method of laying a predetermined number of mines in a very local area and in a predetermined relationship one to the other. This approach is intended to provide a basic "building block" from which any desired density or depth of field can be derived and with which the maximum advantage can be taken of terrain obstacles and of deception in the location of individual mines. This method is best adapted to use in defensive mine belts where "section laying" is not employed, and in barrier fields, either as a basic method for hand laying or as a local supplement or variation to the machine-laying pattern. The basic "building block" for controlled laying should be a part of the section-laying method.

c. Random laying. This method is used in interdictory fields, and to a lesser extent, in those portions of a barrier mine field in which the principal obstacle is the terrain itself. This method provides the nearest approach to absolute concealment and, as such, is used where the consideration of surprise, or psychological effect, is paramount.

d. Summary. The regular laying technique will provide the greatest probability of recovery of the mines within a field and will permit the maximum benefit to be received from training but it produces a field that is the most easily breached by an enemy. It is therefore most useful when

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APPENDIX J STAFF RESPONSIBILITIES

1. PROBLEM. To determine the adequacy of presently established staff responsibility for mine warfare activities with relation to indicated trend in mine warfare doctrine.

2. ASSUMPTIONS.

a. That the following manuals contain all the various aspects of presently established staff responsibility for mine warfare activities.

FM 100-5
FM 101-5

b. That mine warfare doctrine as proposed by the Mine Warfare Panel will be approved as presented and implemented as outlined in the committee report.

c. That staff responsibility to be proposed must provide effective policy applicable under all probable conditions and circumstances to include integration with other allied combat and service units.

3. FACTS.

a. That staff responsibility for mine warfare activities must be definitive at all echelons of command.

b. That mine warfare is a part of our present and future weapons system.

c. That a policy presently exists which establishes staff responsibility.

d. That study refers to "staff" and therefore includes units down to battalion level.

4. DISCUSSION.

a. In considering and reviewing the necessity for staff responsibility, four aspects of the problem are visualized, namely: tactical planning and operations; logistical planning; technical supervision; and supply.

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has interest in enemy mine fields because they are a part of the intelligence material he collects, evaluates, and disseminates.

b. G(S)4 has the responsibility for the logistical planning and the supervision of supply matters to include mine warfare material.

c. A consideration of the various arms and services of the Army indicates that the Corps of Engineers personnel are best qualified, in the light of academic background, training and experience, to provide technical supervision of mine warfare activities. Engineer personnel can be made available to commanders at all echelons of command both for training of unit personnel and for supervising mine and mine field emplacements.

d. Present ordnance channels for procurement, storage, issue, and control of ammunition are well-established and, of all army supply agencies, ordnance is the most appropriate service to be charged with the responsibility for the procurement, storage, issue and control of mine warfare material.

6. RECOMMENDATIONS. It is recommended that present staff responsibility for mine warfare activities as prescribed in FM 100-5 and FM101-5, and as summarized below, be confirmed.

a. That G(S)3 has staff responsibility for tactical planning and operational supervision of mine warfare activities.

b. That G(S)4 has staff responsibility for logistical planning and supervision of mine warfare activities.

c. That the engineer has staff responsibility for technical supervision of mine warfare activities.

d. That the ordnance officer has staff responsibility for supply of mine warfare material (to include procurement, storage, issue and control).

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APPENDIX K

TARGET SELECTION FOR AERIALLY EMPLACED LAND MINES

1. **PROBLEM.** To determine the Army position on target selection for the employment of aerielly emplaced land mines.

2. ASSUMPTIONS.

- a. No specific guidance has been provided the Army member of the Joint Tactical Air Support Board relative to the Army position on target selection for the use of aerielly emplaced land mines.
- b. No change in existing command relationships between tactical air forces and tactical air commands and field armies and army groups will occur in the immediate future.

3. FACTS.

- a. The Air Force has an antipersonnel land mine capable of aerial emplacement, which has recently been employed in EREIA. This mine is the 4-round fragmentation bomb, M 83, (butterfly bomb).
- b. The Air Force has established a research and development project with the mission of developing a family of air-dropped land mines. (Project No. K-555-750, Incl 1).
- c. Doctrine developed by the Mine Warfare Panel permits the use of aerielly emplaced mines.

4. DISCUSSION

- a. The initiation of an Air Force project to develop a family of air-dropped land mines designed to, "delay, canalize and break up an enemy advance or retreat and to disrupt the enemy transportation system", appears to fulfill an Army requirement for such mines. The ground commander must be able to control all weapons, including mines, that are employed against ground targets within his zone of responsibility or within his zone of planned operations. This is even more true of aerielly emplaced land mines than it is of air attacks upon other interdiction type targets. Because of their lasting nature, aerielly emplaced land mines may become as much of a hazard to friendly forces as they were to the enemy, particularly during offensive operations.
- b. The present doctrine of mutual cooperation between air and ground forces will not ensure sufficient positive control of aerial mining by the ground commander. If he is to accomplish his mission, he must have the authority to ensure that only the targets which he selects or approves are attacked within his zone of responsibility. A ground commander not only must be given the means to accomplish his mission but must have that means sufficiently under his control to ensure coordination of the overall operation. This is true regardless of the type of operation. Target selection can certainly be considered a minimum of control over the aerial emplacement of

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mines. Therefore, authority for final selection of ground targets for attack or interdiction by aerially emplaced land mines must be vested in the ground commander responsible for the zone.

g. Two solutions to the problem appear acceptable:

- (1) Designation of a "no-mine line" similar to a bomb line, short of which no mines may be dropped without the authority of the ground commander concerned. - This will provide for flexibility of employment by the Air Force, and in a very slow moving or defensive situation, will provide the minimum essential control by the ground commander.
- (2) Concurrence of the appropriate ground commander (normally army level) before any target may be attacked by aerially emplaced land mines. - This obviously restricts employment by the Air Force commander, but provides the ground commander with the essential authority for proper conduct of the ground battle in rapidly moving attack or pursuit situations.

5. CONCLUSIONS.

- a. That the ground commander concerned (normally field army or higher) must have the authority to designate targets against which air-dropped land mines are to be employed.
- b. That either of the methods described in paragraph 4c above are acceptable, but the ground commander must have the authority to designate which method will be used in a given tactical situation.

6. RECOMMENDATIONS. That the Army member of the Joint Tactical Air Support Board use the above conclusions as the Army position relative to authority for target selection for the interdiction use of aerially emplaced land mines.

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EXTRACT

RESEARCH AND DEVELOPMENT PROJECT CARD NEW PROJECTS

REPORTS CONTROL SYMBOL DND-2

AUTH: CG, ARDC

BY: Norman J. Keefer, Jr., Maj., USAF

DATE: 19 Nov 51

1. Project Title (UNCLASSIFIED TITLE) MINES AND MINING, AERIAL (ML-1716)

3. Project No. R-555-750

5. Report Date: 15 June 1951

6. Basic Field or Subject: Armament Components

8. Cognizant Agency: Air Research and Development Command

9. Directing Agency: Armament Laboratory, WADC, Office Symbol WCEG
Tp 22176

10. Requesting Agency: Headquarters USAF

11. Participation, Coordination, Interest: Corps of Engineers (P) (C),
Ordnance Corps (P) (C), U. S. Army (C) (P), U.S. Navy (C)

15. Priority 1-B

16. A (169/33)

20. Requirement and/or Justification: Operational analysis as to tactics to be employed in any future conflict reveals a need for a family of air-droppable land mines. The aerial mines developed as a result of this program will enable the USAF to install mine fields to delay, canalize, and break up an enemy advance or retreat and to disrupt the enemy transportation system.

21. a. Brief: The program of the project is to study and develop suitable prototype air-droppable land mines. Air Force Financing is presently limited to Phase One feasibility study. Further support will be decided after completion of the feasibility phase.

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b. Approach: Investigation and development will be undertaken of the following interdependent areas:

ARMAMENT SUBCOMMITTEE

- (1) Methods of delivery and operational capability of the Air Force to deliver land mines with the required accuracy.
- (2) Advantages and limitations of aerial land mining techniques.
- (3) Research and development of prototype air-droppable land mines to include:
 - (a) Research on influence fields.
 - (b) Firing mechanism development.
 - (c) Warhead development.
 - (d) Self sterilizing.
- (4) Develop methods of planting mines from the air.

c. Subtasks

The study and development as indicated above on the following:

- (1) Anti-railroad mines.
- (2) Anti-vehicle mines.
- (3) Anti-personnel mines.
- (4) Miscellaneous mines.

d. Other Information

(1) Background

This project was initiated to fulfill the requirement as outlined in letter from Headquarters USAF, referenced below.

(2) References

Letter from Headquarters USAF, subject, "Land Mining by Aircraft," dated 21 March 1951.

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APPENDIX L

ANTIAMPHIBIOUS OPERATIONS

1. **PROBLEM.** To determine doctrine for the employment of mines in anti-amphibious operations.

2. **ASSUMPTIONS.** No clearly defined line has been established to indicate responsibilities of Army or Navy forces in an anti-amphibious operation (Isals 1 & 2).

1. **DISCUSSION.**

a. Responsibility.

(1) The Army is responsible for defending the beach. The Navy is responsible for control operations at sea which is generally interpreted to mean deep-water operations. This leaves a nebulous area between high tide and some undefined point beyond low tide for which definite responsibility has not been fixed. This problem becomes very acute in areas of extreme tides. Final solution of this problem is beyond the scope of this panel and should be referred to the Joint Amphibious Board. However, it is within the scope of the panel to recommend an Army position.

(2) It is believed that the doctrine involved by this panel on the types of mine fields is sufficiently broad and sound to permit any of these types to be employed in anti-amphibious operations, either under water or on shore. The only differences need be in type pattern and types of mines used under water. Further, the Army does provide, in its organization, units that are capable of laying mines under water, e.g., amphibious brigades, reinforced as necessary with Transportation Corps boat battalions or amphibious truck battalions.

(3) Another point to be considered is that the Army must be prepared to conduct freshwater anti-amphibious operations as well as those in salt water, e.g., defense of inland waterways and lakes. To use naval forces in this type of operation would in many instances be impracticable.

(4) It is believed therefore, that to provide consistency in training and to provide the maximum effectiveness and flexibility in the employment of ground means, the ground commander should be responsible for the installation and defense of all types of underwater obstacles to include mines up to a line generally defined as a 6-foot (1 fathom) depth beyond furthest ebb. Certain variations may be necessary, based on local situations.

b. Research, Development, and Procurement. Mines for anti-amphibious use are not now in existence. If the Army is to have responsibility for

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the area described above, then it appears logical that they should have research, development, and procurement responsibility for the materiel. However, the Navy has had much more experience with items of this type than the Army. This experience should not be wasted. It appears, therefore, that the most rapid and economical means of producing the end-item required would be to establish a joint project. This may be done by assigning research, development, and procurement responsibility to the Army, with the Navy providing technical assistance.

4. CONCLUSIONS.

a. That the Joint Amphibious Board should be given the responsibility for determining service responsibility for the development of anti-amphibious doctrine and techniques.

b. That the Army should be responsible for the installation and defense of all types of underwater obstacles to include mines up to a line generally defined as 6-foot (1 fathom) depth beyond furthest ebb.

c. That the Army be responsible for research, development, and procurement of anti-amphibious mines, assisted by technical advice of the Navy.

5. RECOMMENDATIONS.

a. That the Joint Amphibious Board be given responsibility for determining service responsibility for development of anti-amphibious doctrine and techniques.

b. That the Army member of the Joint Amphibious Board be guided by paragraphs 4b and c above.

c. That immediate action be taken to implement the program set forth in 4b above.

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COMMANDING GENERAL, TEC & FB FT BELVOIR VA

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PRESIDENT

JOINT AMPHIBIOUS BOARD

ROUTINE

I

AMPHIBIOUS TRAINING COMMAND

LITTLE CREEK, NORFOLK VA

FROM: TECES-OF _____

MINE WARFARE PANEL CONVENED AT THE ENGR SCH HAS BEEN CHARGED WITH PREPARING A STUDY ON LAND MINE WARFARE WITH A VIEW TOWARD IMPROVING PRESENT DOCTRINE CMM TECHNIQUES CMM RESEARCH AND DEVELOPMENT PROGRAM PD REQUEST YOUR VIEWS ON THE USE OF LAND AND ANTI-BOAT MINES IN ANTIAMPHIBIOUS OPERATIONS TO INCLUDE ANY DECISION OR RECOMMENDATION MADE BY YOUR BOARD AS TO WHERE NAVY RESPONSIBILITY SHOULD END AND ARMY RESPONSIBILITY BEGIN PD THIS PANEL MUST COMPLETE ITS FINAL REPORT BY ONE ZERO MARCH PD REPLY BY TWX REQUESTED PD

UNCLASSIFIED

TECES-SY R.M. MCCARTHEY CAPT CE 011200

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R 052139Z

FM CHAIRMAN JOINT AMPHIBIOUS BOARD

TO CG FORT BELVOIR VA ATTN MR. WARFARE PANEL

GRMC

/R E S T R I C T E D / YOUR 011700Z NR 34 MAR X COLLECTIVE OPINION OF BOARD FOLLOWS ABLE ENEMY WILL USE ALL TYPES OF OBSTACLES TO DEFEND HIS BEACHES BAKER JOINT DOCTRINES AND PROCEDURES FOR NEUTRALIZATION OF SURF ZONE AND SHORE OBSTACLES ARE UNDER STUDY CHARLIE ARMY RESPONSIBILITIES FOR PLANTING AND REMOVAL OF OBSTACLES EXTEND LANDWARD FROM HIGHWATER MARK COMMA NAVY SEA AND FROM HIGHWATER MARK COMMA ZONES OVERLAP LOG UNDERWATER DEMOLITION UNITS ARE QUALIFIED REMOVAL OF OBSTACLES BOTH SURF ZONE AND SHORE

CFN 021700Z 34

06/1146Z MAR XXXX

Incl 2.

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APPENDIX M

ANTI-AIRBORNE OPERATIONS

1. **PROBLEM.** To determine the need for an antiairborne mine, and if such a need is found to exist, to determine the responsibility for the development of both the mine and of the doctrine for its employment.
2. **ASSUMPTION.** The enemy has the capability of launching a major airborne assault.
3. **FACTS.** Ground commanders with area responsibility are responsible for ground defense against airborne attack within their areas.
4. **DISCUSSION.**

a. Targets for airborne attack may be important bridges, defiles, and key terrain features in the combat zone. In the communications zone, targets may be ship yards, ports, depots, and airfields. Airborne forces may be expected to attack these targets with surprise, in mass and under cover of heavy air support. Ground defense against an airborne attack is conducted by engaging airborne aircraft with every available gun, by launching local counterattacks with speed and vigor, and by committing mobile reserves as soon as the main landing is determined. Defense against an airborne attack is conducted passively by obscuring likely landing sites, erecting road blocks, use of camouflage, construction of shelters, and emplacement of mine fields. The mine fields so installed might well be termed antiairborne mine fields.

b. Mine fields installed specifically to defend against an airborne assault will confuse and disorganize the enemy although they cannot prevent his landing. To be most effective they should attack enemy aircraft during landing, parachutists prior to landing and after landing, and enemy vehicles on the ground. Mines which we have at present cannot attack aircraft or personnel while airborne. Antiairborne mine fields would be more effective if such a mine were in existence; however, the use of such a mine would require coordination with adjacent Air Force and antiaircraft artillery units.

c. In the combat zone, army and army group commanders will coordinate air defense and thus will authorize installation of antiairborne mine fields. Such fields may be installed by troops given responsibility for an area. The doctrine and technique for the planning, employment, and installation of such mine fields in the combat zone would appear to be of primary interest to the Army.

d. The commander of the communications zone is responsible for defense against airborne attack within his communications zone. The use

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of mine fields and other passive means of antiairborne defense will be particularly important in this case, because local and mobile reserves are more limited here than in the combat zone.

a. Mine fields installed to defend against airborne attack are peculiar only in the targets to be attacked. Basically, these antiairborne mine fields perform the conventional functions of delaying and hindering the enemy's advance by interdicting his avenues of approach. These mine fields fall into the functional classifications - security, defensive, barrier, and deceptive mine fields - to be recommended by the Mine Warfare Panel; hence they do not warrant a separate classification.

4. CONCLUSIONS.

a. A mine field designed to counter an airborne attack will serve a useful purpose.

b. A mine capable of attacking aircraft and parachutists just prior to landing will strengthen a mine field designed to counter an airborne attack.

c. Doctrine relative to the employment of an antiairborne mine will require coordination with the Air Force.

5. RECOMMENDATIONS.

a. That FM 5-32 include doctrine pertaining to the employment of antiairborne mine fields (appendix A).

b. That the Army member of the Joint Airborne Board coordinate such doctrine as is developed pertaining to the use of antiairborne mine fields.

c. That a feasibility study be initiated to determine the desirability of utilizing and the feasibility of developing an antiairborne mine.

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APPENDIX E

SAMPLE COMPUTATION F MINE REQUIREMENTS

1. The validity of the factors used herein is not defended. These factors are those now available and in use. The situation used is completely an assumed situation on terrain similar to Western Europe. This computation has no practical application as any logistical analysis must be based on a known situation and is included for illustrative purposes only.
2. Theater has 400-mile front, 30-division force. Mission at the outbreak of hostilities is to defend in the theater until a sufficient force can be built up to permit the mounting of a counteroffensive. A regimental strong point type of defense is visualized; approximately 15 divisions are withheld under army and army group control as a mobile reserve force to block major penetrations and restore the position. It is estimated that division and corps reserves will be the equivalent of 15 divisions. The average width of regimental strong points will be about 3000 yards. Six successive defensive positions in depth will be prepared, each sited to the maximum extent possible along terrain obstacles and built up with defensive and barrier mine fields. Interdictory mine fields will be used between positions to effect maximum canalization. Problem is to compute the initial and the replacement requirement for AT and AP mines in the preparation and defense of these positions as the buildup is carried on and until the counteroffensive is launched.

SECURITY MINE FIELDS: Each division will carry as a part of its basic load 3000 AT and 3000 AP mines to be used primarily in security mine fields. These mines will require complete replacement on a 30-day cycle.

Initial Req't - 150,000 AT

150,000 AP

Repl Req't - 150,000 AT

/Mo.

150,000 AP

DEFENSIVE MINE FIELDS: Study of the successive lines and the proposed defensive positions indicates that an average of 1 AT mine and 1 1/2 AP mines per yard of actively defended front will be required. Local densities of 3 mines/yard will be required; other local areas, due to terrain obstacles, will require no mines. 180,000 yards of front will be actively defended with troops in position in each of the 6 positions in depth. It is estimated that 1/5 of these mines must be replaced each month.

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Initial Reqn't - 1,050,000 AT

1,620,000 AP

Repl Reqn't

180,000 AP

/Mo.

270,000 AP

BARRIER MINE FIELDS: The defensive action contemplated will result in the active defense by troops in position of only about 25% of the total frontage. In the intervals between occupied positions the enemy must be delayed sufficiently to permit the shifting of reserves to meet him. These areas will be blocked by mine fields which will be under surveillance and under long-range fires but must be self-protecting to the maximum possible degree. Study of these areas indicates that an average of 3 AT mines and 6 AP mines per yard of front will be required. Local densities of 6-8 mines/yard of front will be required; other areas will require only scattered AP or AT mines as the terrain itself will be a major obstacle. 524,000 yards of front are in this category in 6 positions in depth. It is estimated, as in the defensive field, that 1/6 of these mines must be replaced each month.

Initial Reqn't - 9,432,000 AT

18,864,000 AP

Repl Reqn't - 1,572,000 AT

3,144,000 AP/MO.

INTERDICTORY AND MISCELLANEOUS BARRIER MINE FIELDS: Aerial mine fields to canalize the enemy and small, dense, local mine fields to deny the enemy the use of local areas will be required in the intervals between major positions. In addition, mining of likely airborne drop areas in our rear will be undertaken. These requirements are estimated as 20% of the requirement for barrier mine fields with a replacement rate of 1/6 per month.

Initial Reqn't - 1,886,400 AT

3,772,800 AP

Repl Reqn't - 314,400 AT

628,800 AP/MO.

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Total initial requirements are 12,548,400 AT mines and 24,408,800 AP mines. Initial replacement requirements are 2,216,400 AT mines and 4,192,800 AP mines per month or 73,880 AT mines and 139,700 AP mines per day. As the theater force builds up and its offensive capability increases, this requirement will progressively diminish.

FM 101-10 indicates, on the basis of experience in WW II, that an infantry division in defense of a position requires 610 tons of supply of all classes per day. This logistic requirement is the greatest shown for any type operation and reflects, apparently, the initial requirement for preparation of the position as well as the maintenance requirement for fighting from the position. New weapons developments and the great numerical inferiority of our assumed force however lead to the acceptance of this figure as our probable overall supply requirement for the assumed 50-division force in the initial phases of its operation. The supply requirement then at division level is a total of 30,500 tons/day. The mine requirement above in tons, may be computed on this basis: The average AT mine, packaged, will weigh 30 pounds. The average AP mine, packaged, will weigh 5 pounds. The mine requirement is 1108 tons of AT mines and 350 tons of AP mines per day, a total of 1458 tons/day or 5% of the total supply requirement at division level. This logistic requirement does not appear excessive.

FM 101-10 also indicates that one man can lay 5 AT mines/hour or 4 activated AT or AP mines/hour. The manpower requirement, discounting storage and transportation to forward supply points, to use these mines may then be computed as follows: 15% of all AT mines will be activated (booby trapped). 150,832 of the mines will be laid at a rate of 4 per hour; 62,798 at a rate of 5 per hour. 50,268 man hours will be required. Assuming that individuals laying these mines will work an average of 10 hours per day, 5030 men will be required. AT mine platoons of the infantry regiments included in the committed force, and the local reserve category total 3255 men. Pioneer and ammunition platoons within the infantry regiments included in the above category total 8505 men. Line platoons of the divisional engineer combat battalions of the 35 divisions committed or in local reserve total 18,050 men. Assuming that the theater force, exclusive of theater reserve, is organized into 9 corps, 20,898 men are available in the line platoons of the supporting engineer combat battalions of the corps. This totals 40,718 men. The mine laying herein contemplated will then require the average commitment of about 12% of these available people. This requirement does not seem excessive.

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APPENDIX O

NEW DEVELOPMENTS

1. **PROBLEM.** To evaluate doctrine developed by the Mine Warfare Panel in the light of future developments in materiel and equipment which are planned or anticipated.

2. ASSUMPTIONS.

A. As long as the present international situation continues, development of new equipment and materiel designed for use in land mine warfare will continue at approximately its present rate.

B. The following development of individual items is anticipated:

(1) Antitank mines containing influence fuses and capable of killing a tank, and personnel within a tank. Antitank mines that are more difficult to detect due to deeper burying and a zero metal content, and that are capable of aerial and mechanical laying.

(2) Antipersonnel mines capable of delay arming, self-sterilization, machine laying, greater fragmentation, nondetectability and greater deadliness.

(3) Special purpose mines with contact and influence fuses, capable of damage to amphibious landing craft of extended immersion, of floating downstream against bridges, and of attacking air transport and landing troops.

(4) Air delivered antitank and antipersonnel mines with disturbance fuses, capable of emplacement by aircraft, artillery, and guided missiles.

(5) Chemical contamination mines, suitable for conventional emplacement. Radiological and biological mines will not be developed.

(6) Mechanical mine layers for both AP and AF mines.

(7) Vehicle mounted and hand operated mine detectors capable of dependable detection of both metallic and nonmetallic mines.

(8) More effective mechanical and explosive assault breaching devices.

3. **FACTS.** The mine warfare doctrine prepared by the Mine Warfare Panel was written with full knowledge of all mine warfare equipment and materiel under development or capable of being developed in the near future.

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4. DISCUSSION.

Both strategic and tactical operations can be greatly assisted by the proper employment of mine fields. The primary means of employing mine fields to assist in operations are described in the discussions of security, defensive, barrier, interdictory, and deceptive mine fields, appendix A. These mine fields must have certain characteristics in order to effectively fulfill their intended functions. The requisite characteristics are obtained by proper employment of the proper types of mines. The effectiveness of each functional type of mine field using appropriate equipment and material which may be developed, will be compared with the effectiveness resulting from usage of currently available equipment and material.

(1) Security mine fields. Antitank and antipersonnel mines (particularly with self-sterilization and nondetectable features) to be developed will result in greater deadlines, present greater breaching difficulty to the enemy, and more flexible usage by friendly troops. Other types of mines and equipment to be developed will probably not be used in a security mine field. It is obvious, therefore, that future developments will result in a more effective security mine field.

(2) Defensive mine fields. Antitank mines with tank-killing and influence-fuse features and nondetectable AP mines to be developed, will result in a more lethal mine field that is more difficult of removal by the enemy. Obviously, this will result in a more effective defensive mine field. Similarly, special purpose mines which may be developed will render the field more effective when used. Mechanical mine layers may be used in defensive mine fields and, if used have a desirable offset.

(3) Barrier mine fields. Conceivably every type of mine to be developed can be used in a barrier mine field. Antitank and antipersonnel mines to be developed will perform their basic functions more effectively than existing mines. Special purpose mines perform functions not satisfactorily performed with present mines. Air delivered mines make it possible to reach and increase density to an extent not possible with existing mines. Mechanical mine layers to be developed make possible the laying of large barrier mine fields not practicable with existing techniques. Hence, new developments will in every instance render barrier mine fields more effective than is presently possible.

(4) Interdictory mine fields. Maximum effectiveness of interdictory mine fields is dependent upon development of air delivered AT and AP mines. Existing mines can be used to create interdictory mine fields of limited effectiveness. AT, AP, special purpose, and chemical mines to be developed will greatly enlarge the variety of targets which can be attacked and multiply the mine field neutralization problem of the enemy. Mechanical mine layers will have little effect upon interdictory mine fields as they will seldom be used. It appears that new developments will have a very desirable positive effect upon interdictory mine fields.

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(5) Deceptive mine fields. New mines which are more difficult of detection and removal will increase the effectiveness of deceptive mine fields.

b. Assault breaching of enemy mine fields and the subsequent clearing of these fields with current detectors and eradicators are not efficient operations. The development of better equipment will inevitably increase the efficiency of the operation.

c. Utilization of new developments to their maximum is dependent not only upon the existence of doctrine which provides guidance for such utilization, but also upon the thoroughness of training at all levels and upon the application of individual ingenuity.

4. **CONCLUSION.** Doctrine developed by the Mine Warfare Panel will not be adversely affected by future developments in materiel and equipment. In fact, the proposed doctrine is capable of utilizing foreseeable development to their maximum capabilities.

5. **RECOMMENDATIONS.** It is recommended that the final report of the Mine Warfare Panel state that the doctrine recommended was designed to provide for maximum utilization of all developments of materiel and equipment which may occur in the foreseeable future.

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ANNEX 1

PART TWO - TRAINING

1. PROBLEM: To establish a general policy for mine warfare training.

2. DISCUSSION.

a. Observer reports and extracts of command reports from Korea, and observer reports from current and recent maneuvers, all indicate serious inadequacies in troop and staff training in existing mine warfare doctrine. Reference is made to GPO Memorandum T-132 and to the attached extracts from unit command reports. Many of these inadequacies exist in the field of training in technique; more exist in the indoctrination or appreciation aspect. The general trend of thought in the Mine Warfare Panel appears to be toward a wider, more liberal use of mines. This will render current training practice and policy even less adequate, as wider use will require greater troop involvement in technique and greater staff appreciation of the capabilities and limitations inherent in the mine.

b. The current training base in mine warfare, particularly in staff officers and commanders of units from battalion size and up, has been derived primarily from experience in World War II; secondarily from exposure to formal programs of training. World War II experience was received, generally, in a situation where we were on an overall offensive and as a consequence made little use of mines; the enemy being on an overall defensive, made widespread use of mines. We are therefore well-indoctrinated in the limitations to action imposed by mines but are not equally well-indoctrinated in the measures which may be taken in the planned use of mines to minimize the limitations imposed on our action. Those limitations which we now recognize, as seen from the attacker's view, become capabilities when viewed by a defender. Our training must enable the staff officer or commander to view the mine in proper perspective through the eyes of both the defender and the attacker. Beyond this, we must expand his thinking to embrace post-war mine developments and probable developments of the immediate future. Army training policy in schools for senior officers is based on rapid expansion in time of war and consequently the officer student is taught the doctrines and skills appropriate to several grade levels higher. Lead time between training and practical application is from 1 to 5 years. Training him in a basic appreciation of mines should therefore include the use of potential general material which may be in use 5 years in the future.

c. Training of individuals in techniques must be broadened as the use of mines is broadened. Two extremes and varying degrees of compromise in the approach to this problem are apparent. The first extreme is to create a larger group of relatively well-trained specialists and distribute

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then throughout our troop structure. This will interfere with the maximum flexibility in use of personnel and will increase the burden on the replacement system and therefore does not appear desirable. The second extreme approach is to broaden the training of all individuals in proportion to their probable exposure to mine warfare and its effects. This will create little demand for a single-purpose specialist and will not rob us of flexibility in the use of personnel, but will increase by some degree the overall training factor. Inevitably it will serve to increase the time length of the personnel pipeline, although a reappraisal of specific training programs may indicate less remunerative training now included therein. Compromises between these extremes may eliminate some of the objections to both. A general compromise would be to train all individuals in the general aspects of mine warfare, and to train within those units most affected by mine warfare, a basic core of specialists to plan, supervise, and, insofar as possible, to implement mine warfare plans. More extensive use of mines in any future conflict is a probability. This usage will vary from the general use of mines within a battle position to the use of mine fields laid in friendly rear areas to protect small service units or installations against partisan or airborne attack. It may include sowing of mines by air or emplacement of mines by partisans deep in an enemy rear area to harass him or deny him the use of a given area. In order to establish a realistic training requirement, we must presume that any future enemy will use mines to at least the extent that we do. It is therefore essential, as a minimum, that each individual be able to identify a mine, know the extent to which mines may limit him, and be able to use simple mines effectively to protect himself. The more technical aspects of mine warfare operations must be dealt with by fully trained troops available throughout all echelons of the Army, troops available, as required, in the division area or deep in the communication zone. It then appears that the most favorable solution to this problem is to broaden the scope of individual training within the framework of present basic branch missions, a compromise between the two extremes.

d. The tools of mine warfare cover a wide range of complexity. Some are simple and designed for mass employment. Others are, and will probably continue to be, more complex and designed for employment under rather special and controlled conditions. However, all may be encountered by any troop unit and must be recognized. The first minimum then in mine warfare training of all individuals as such, is training in the ability to recognize all American and allied mine warfare materiel as well as known enemy materiel. With this training should go additional training in the range of means of initiation and effect within mine warfare materiel.

e. Beyond this, every soldier should be trained in the techniques of emplacement, arming, and disarming of those mines designed for general use, and in the proper use of mine-field markings. This should include all mines used in security mine fields as a minimum. Formal NCO and junior officer training in all branches should also include basic instruction in

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mine field siting, basic laying drills, marking, recording, and reporting. The basic soldier should be familiarized in these techniques to the extent of having participated in his training in the laying of practice mine fields.

f. Advanced individual training and unit training within the combat arms should firm up the techniques imparted in basic individual training by repetition and should include familiarization instruction in detection and in breaching materiel and techniques. This group should also receive familiarization training with the more complex mines and fuzes not included in the basic program.

g. Engineer advanced individual training, unit training of combat type units and construction battalions, and specialist training in appropriate units of the combat arms should all consist of repetition and mastery of the techniques used in mine field detection and breaching and of further instruction in the emplacement, arming, and disarming of the more complex mines and fuzes. This should include training in the organization and supervision of mine laying operations using unskilled troop or indigenous labor and, in engineer units, unit mine laying operations including use of personnel, and mechanical mine-laying equipment.

h. Seemingly, the most urgent mine warfare training requirement at the present time is the need for indoctrination of unit commanders and staff officers in the use and appreciation of mine warfare materiel to the extent that it is considered a normal adjunct to their other offensive and defensive means. When this has been realized, the appreciation must be kept alive by the realistic inclusion of mine warfare into maneuvers, unit tactical exercises, map exercises, refresher training, and all other such operations. Such integration of mine warfare training must begin with small unit training and be included wherever and whenever appropriate thereafter. Appreciation of mine warfare and realistic, continuing attention to mine warfare in training is essential if the advantages which it may give us are to be realized. Whatever doctrine is adopted must be supported in training or had best not be adopted at all.

3. CONCLUSIONS.

a. Thorough, up-to-date, realistic mine warfare training for all commanders and staff officers is necessary if full advantage is to be taken of mine warfare to augment offensive and defensive capabilities.

b. Developments in the field of mine warfare materiel and the probable increase in the practice of mine warfare both by ourselves and an enemy make it imperative that more complete and intensive mine warfare training be given both to all individuals and to mine warfare specialists.

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c. Mine warfare consciousness must be maintained at a high level by a continuing play of mine warfare in unit exercises, maneuvers, and map exercises and by continued refresher training.

4. RECOMMENDATIONS

a. That all mine warfare developmental projects be accompanied by concurrent projects for development of training materiel.

b. That as the probability of adoption of an item of mine warfare materiel in substantially its developmental form is recognized, Army Field Forces provide for the early issue of the item to Service Schools, as appropriate, for their early use in the formulation of doctrine and technique for its employment. Where minor deficiencies in the item appear to be the only bar to standardization, issues should be made of developmental prototypes.

c. That maximum play of mine warfare be included in maneuvers, and in unit tactical exercises and map exercises in ATP's and school programs of instruction.

d. That the allocation of training hours and the training objectives indicated in Appendix B be approved for inclusion in POI's and ATP's.

e. That a mine warfare indoctrination program in three phases be undertaken and completed as expeditiously as possible. Phasing of the program to be as follows:

(1) Indoctrination of senior commanders and staff officers. (Army, corps, and division commanders and selected staff officers). It is recommended that this phase of the program be of 5 to 7 days duration and be conducted by the Army War College with the technical assistance of the Engineer School and the Aberdeen Proving Ground. This phase of the program must stress the need for careful integration of mine warfare plans with other plans at both the strategic and tactical levels. It must summarize and demonstrate progress in research and development and the development of doctrine.

(2) Indoctrination of instructors for Phase 1. The portion of this instruction dealing with doctrine should be conducted by an agency of service-wide interest with support in instruction on technique by The Engineer School, and in new mine-materiel development by the appropriate agency of the Ordnance Corps. The integration of mine warfare plans with other plans must be stressed.

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(3) Indoctrination of all personnel. This instruction should be based on new mine-warfare materiel and approved mine-warfare doctrine. It is recommended that this program be conducted at station or unit level and be of about 8-hour duration for all officers and 4-hour duration for other personnel.

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NONE

Appendices

- A. Command Report Extracts.
- B. Recommended Mine Warfare Training Objectives and Training Hours.
- C. Comparison of proposed and Current Training in Mine Warfare.

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APPENDIX A

PART TWO - ANNEX I

COMMAND REPORT EXTRACTS

SOURCE: Command Report - 8th Engr Combat Bn

DATE: August 1951

EXTRACT

CONCEPTS OF DIVISION ENGINEER

* * * * *

II Minefields

Mines and minefields occupied much of the battalion's time during the month as would normally be expected in a defensive position such as the one the division now occupies. Casualties incurred both by laying personnel and other friendly troops indicates the necessity for:

- a. Intensified training of engineer personnel in the laying, marking and recording of minefields.
- b. Decrease in the time lag in dissemination of minefield location overlays after their installation.
- c. Additional training periods to familiarize all personnel with the standard means of marking minefields.

An additional mine hazard developed recently when troops, other than engineers, emplaced booby traps and trip flares without recording location or using any system to physically mark their location in the defensive position. Strict adherence to mine doctrine would, of course, preclude such occurrences. Because of unfamiliarity of many combat leaders with this doctrine, it is recommended that the following be included in division operational SOP's:

- a. Under usual and normal circumstances mines and booby traps will be laid by engineers.
- b. Mines placed as temporary local security will not be buried and will be kept to a minimum. They will be guarded to prevent friendly troops or vehicles from encountering them. Records will be prepared by the

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laying unit. These mines will be removed by the laying unit when the need for them no longer exists. In the event enemy action prevents removal of mines, detailed records will be forwarded to division headquarters, Attn: Engineer, without delay, in order that this information can be included in the engineer mine field overlay and disseminated to all units of the division.

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SOURCE: Command Report of Chief of Staff Section - 24th Inf Div

DATE: February 1951

E X T R A C T

FROM: HUBAK

TO: See Distribution

1. It has come to the attention of the Army Commander that the standard American Minefield Doctrine is being widely violated by many units in Korea. Some of the more flagrant violations are listed below.

a. The widespread use of buried anti-personnel and anti-tank mines as unit fields. Unit minefields are never buried but are laid on top of the ground and must be removed by the laying unit before withdrawal from the area.

b. Improper recording and reporting of anti-personnel mine fields. Anti-personnel minefields reports are always forwarded to Division, Corps and Army Headquarters.

c. Failure to report local security or unit minefields when overrun or abandoned to the enemy. All such fields when abandoned or overrun become nuisance fields and must be reported to Division, Corps and Army Headquarters.

d. Failure of units to properly orient relieving units of the minefields within their area. Enough local records must be kept to orient a relieving unit of exact locations, type and number of mines in the area.

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SOURCE: Command Report - I US Corps

DATE: May 1951

EXTRACT

Line GOLDEN was a defense line to which additions were made in depth after all of the front was initially covered with fortifications. The lack of adequate planning in the placing of mine fields was evident when it was found that reference points of some mine fields were in the midst of other mine fields. This presented a hazard to the unit which might later be required to remove the minefields. The solution to the problem in such cases was advance engineer planning of the mine fields by the Division Engineer and the interested infantry commander. The engineer company which is to lay the mine field should be made fully aware of the locations of proposed mine fields before laying the first fields, so that reference points can be established well clear of sites selected for other fields and so that they can be reached safely at any time.

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SOURCE: Command Report - 187th Abn RCT

DATE: July 1951

EXTRACT

The Engineers conducted a four (4) week course for the Battalion Pioneer and Ammunition Platoons and the Regimental Antitank and Mine Platoon. Upon completion of the course, the units will have received instruction in the following: Laying of mine fields (AT and AP); recording mine fields (AT and AP); booby trapping of all type mine fields; proper handling and use of all type of explosives; engineer road reconnaissance; booby traps; employment of wire entanglement and trip flares; use of native materials for construction purposes. It is felt that familiarization with this type of work will be a decided benefit for the respective battalion concerned.

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SOURCE: Combat Notes _ Hq IX Corps

DATE: 20 October 1951

EXTRACT

The operation was hampered by lack of information on the location of friendly mine fields. One tank was disabled by a friendly mine. It is mandatory that accurate information of friendly mine fields be disseminated to company level, especially tank and armored reconnaissance companies. Our mine doctrine calls for dissemination of this information. Somewhere information existed of the friendly mine fields in CHUNGBON, but the TF Commander did not have it.

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SOURCE: Command Report - Hq 3d Engr (C) RM - Staff Journal

DATE: April 1961

EXTRACT

Since the area in which the Divisional elements were involved had been previously defended during the Eighth Army withdrawal there were countless scattered mine fields. Some of these had been properly recorded and were easily and quickly removed. In the majority, however, were small isolated groups or fields of mines often booby-trapped, found only when friendly troops were injured within that area. Even with the aid of mine field reports the removal of the field was made extremely difficult by the inaccuracies of the detailed reports. Close examination of the field as compared with the reports indicated that the reports had been submitted because an order existed to that effect without the consideration that some other unit would be required to perform the removal of the field.

The various locations of the fields, the failure of not using or arming mines correctly, and the use of such items as bore safe mortar shells as AP mines, further emphasizes the fact that more and better training is required for all ranks and branches if highest efficiency and minimum casualties to friendly troops is to be obtained.

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SOURCE: Command Report - 3d Engr C Bn.

DATE: November 1951

EXTRACT

In the development of defenses on Line "Polar", the Regimental AT and M Platoons were employed in mine laying under the supervision of an Engineer Officer who performed a dual function of supervisor and recorder. The value of this arrangement is very noteworthy. It assures an accurate record of the mine field by utilization of the engineer officer, offers maximum training in mine fields to the AT & M Platoons and releases engineer troops for other jobs.

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APPENDIX B

PART TWO - ANNEX I

RECOMMENDED MINE WARFARE

TRAINING OBJECTIVES AND TRAINING HOURS

1. OFFICER TRAINING. Training hours recommended are those required for mine warfare instruction as such, and do not include the integrated training in mine warfare which should be part of map exercises, terrain exercises, etc.

- a. Officer Candidate Schools and ROTC programs of all branches:
20 hours.

Recognition of American, Allied, and enemy mine warfare material; emplacement, arming, and disarming of American mines recommended for use in security mine fields; mine field siting; mine field laying; drill; mine field marking, recording, and reporting.

- b. Infantry, Armored, Artillery, and Engineer Officer Candidate Schools and ROTC programs - 44 hours.

Objectives shown in paragraph 1 a and in addition: the emplacement, arming, and disarming of all standard American mines; mine field detection and breaching material and technique; unit mine laying operations, including the capabilities of mechanical layers and the organization and supervision of unskilled labor in mine laying.

- c. Basic and Company Officer Courses of all branches - 20 hours.

Objectives shown in 1 a, with emphasis on mine field siting, marking, and reporting.

- d. Infantry, Armored, artillery, and Engineer Basic and Company Officer Courses - 12 hours.

Objectives shown in 1b, with emphasis on mine field siting, marking, and reporting; and unit mine field laying and mine breaching operations.

- e. Advanced and Field Officer Courses of all branches - 8 hours.

New developments in mine warfare material; mine warfare tactics as applicable to branch operations.

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f. Infantry, Armored, and Artillery Advanced and Field Officer Courses - 12 hours.

Review of training included in 1d; new developments in American and foreign mine warfare materiel; emphasize strategic and tactical mine warfare doctrine in division-level operations and barrier planning.

g. Engineer Advanced and Field Officer Courses - 20 hours.

Objectives in 1d and f, and engineer staff planning for mine warfare operations.

h. Command and General Staff College - 8 hours.

Tactical and strategic mine warfare doctrine in operations up to Army level; new developments in mine warfare materiel.

2. NONCOMMISSIONED OFFICER TRAINING. The objectives and allocation of hours for NCO training in appropriate leader MOS should parallel those shown in paragraphs 1g and h above.

3. INDIVIDUAL TRAINING.

a. Basic Individual Training (ATP's 21-110 N and 21-114) - 16 hours.

Recognition of American, Allied, and enemy mine warfare materiel; typical uses of mine warfare materiel; emplacement, arming, and disarming of American mines recommended for use in security mine fields; mine field marking; familiarization training in laying drills and mine field recording.

b. Advanced Individual Training (ATP's 6-600-1, 7-600-1, 7-601-1, 17-600-1) - 32 hours.

Objectives shown in 3a, and emplacement, arming, and disarming of American and allied mines; mine detection and breaching materiel and techniques.

c. Advanced Individual Training (ATP 5-600-1) - 48 hours.

Objectives shown in 3b; mine laying operations to include familiarization with mechanical mine layers.

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4. UNIT TRAINING (in addition to appropriate individual training shown in par 3).

- a. All units - 8 hours. Laying and removal of security mine fields; integrated training in use of security mine fields and mine awareness.
- b. Infantry Regiment (ATP 7-300) - 24 hours. Unit mine laying and mine field breaching operations. All unit tactical training will include the employment of mines and the breaching of gaps.

- (1) Pioneer and Ammunition Platoon - 40 hours.

- (2) Antitank Mine Platoon - 150 hours.

Unit mine laying and mine field breaching operations; organization and supervision of mine laying operations; mine field marking and recording. (Hours shown do not include mine warfare training incident to operation as a part of a larger unit).

- c. Tank Battalion (ATP 17-300), and Artillery Battalion (ATP 6-300).

- (1) Tank Company (ATP 17-201) - 24 hours.

Unit mine laying and mine field breaching operations.

- (2) Reconnaissance Company and reconnaissance platoon. - 40 hours.

Unit mine laying and mine field breaching operations; organization and supervision of mine laying operations; mine field marking and recording.

- d. Engineer Combat Bn, Army (ATP 5-301), Engineer Combat Bn, Inf Div. (ATP 5-300), Armored Engineer Bn (ATP 5-302), Airborne Engineer Bn (ATP 5-303), Engineer Construction Bn (ATP 5-312) - 48 hours.

Unit mine laying and mine field breaching operations; mine field clearance operations; organization and supervision of mine laying operations to include mechanical laying; mine field marking and recording. (The hours shown do not include mine warfare training incident to combined unit training and maneuvers).

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APPENDIX C

PART TWO - ANNEX I

COMPARISON OF PROPOSED AND CURRENT TRAINING IN MINE WARFARE IN TYPICAL ATP'S

ATP	<u>Current hours of training</u>		<u>Proposed hours of training</u>	
	Individual	Unit	Individual	Unit
21-114	8		16	
5-600-1	28		48	
7-600-1	8		32	
7-601-1	8		32	
6-600-1	6		32	
17-600-1	6		32	
5-300	12	48	48	48
5-301	12	48	48	48
5-302	12	68	48	48
5-312	24	20	48	48
7-300	9		32	24
Pioneer and	9		32	40
Ammunition Plat.		40	32	
AT Mine Plat.	9	172	32	150
6-300	6	16	32	24
11-300		6	16	8
17-300			32	24
17-201			32	24
Rem Plat & Rem Co			32	40
10-200		6	16	8
11-200		6	16	8

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